FOREWORD

HOW TO USE THIS MANUAL

CONTENTS

SERIAL NUMBER

Citycom.300i

SERVICE MANUAL

Foreword

This service manual contains the technical data of each component inspection and repairment for the SANYANG LH30W series scooter. The manual is shown with illustrations and focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment”, providing technicians with service guidelines.

If the style or the mechanical structures of the scooter, LH30W series scooter, are different from those of the photos or pictures shown in this manual, the actual vehicle shall prevail. Specifications are subject to changes without notice.

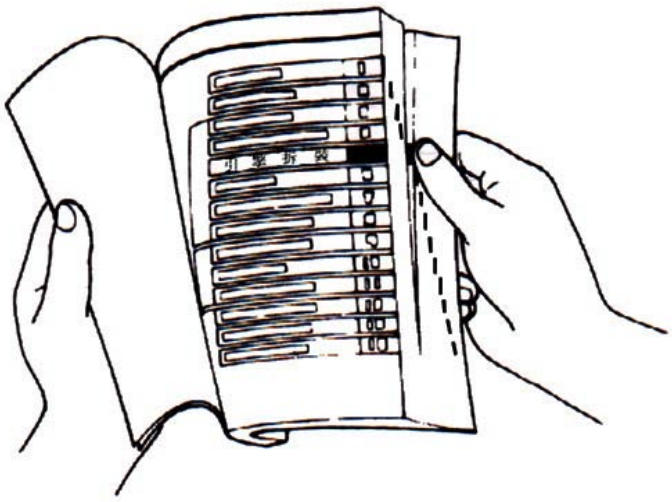
Service Department

SANYANG INDUSTRY CO., LTD.

How To Use This Manual

This service manual describes the basic information of different system parts and system inspection & service for SANYANG LH30W series scooter. In addition, please refer to the manual contents in detail for the model you serviced in inspection and adjustment.

The first chapter covers the general information and the trouble diagnosis.
The second chapter covers the periodic maintenance information and the special tool models.
The third to the 11th chapters cover the engine and the driving systems.
The 12th chapter is the cooling system.
The 13th to the 16th chapter contain the relative parts of the body frame assembly.
The 17th chapter is the electrical system.
The 18th chapter is the emission control system.
The 19th chapter is the wiring diagram.
Please see index of content for quick having the special parts and system information.



There are 4 buttons, “Foreword”, “Contents”, “How to use this manual” and “Mechanism Illustrations” on the CD-R version, and can be access to these items by click the mouse.

If user wants to look for the content of each chapter, selecting the words of each chapter on the contents can reach to each chapter. There are two buttons, “Homepage and contents, onto the top line of first page of the each chapter. Thus, if the user needs to check other chapters, he can click the top buttons to back the homepage or contents. The content of each chapter can be selected too. Therefore, when needs to checking the content inside of the chapter, click the content words of the chapter so that can back to the initial section of the content. In addition, there is a “To this chapter contents” button at the second page of each contents so that clicking the button can back to the contents of this chapter.

SYM

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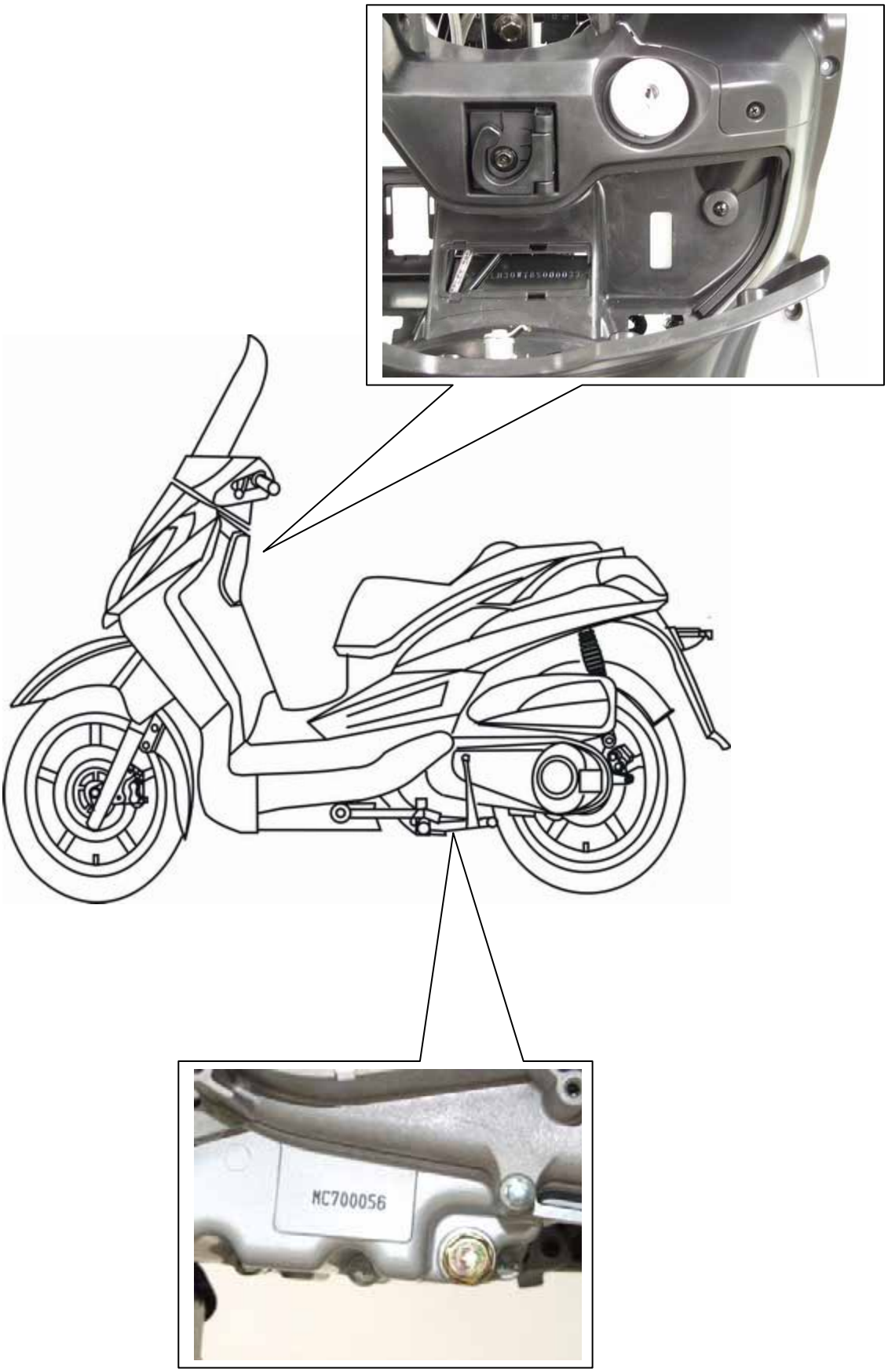
Serial Number



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Symbols and Marks

Symbols and marks are used in this manual to indicate what and where the special service are needed, in case supplemental information is needed for these symbols and marks, explanations will be added to the text instead of using the symbols or marks only.

Warning	Means that serious injury or even death may result if procedures are not followed.
Caution	Means that equipment damages may result if procedures are not followed.
Engine oil	Limits to use SAE 10W-30 API SG class oil. Warranty will not cover the damage that caused by not apply with the limited engine oil. (Recommended oil: KING MATE G-3 oil)
Grease	King Mate G-3 is recommended.
Gear oil	King Mate gear oil serials are recommended. (Bramax HYPOID GEAR OIL # 140)
Locking sealant	Apply sealant, medium strength sealant should be used unless otherwise specified.
Oil seal	Apply with lubricant. .
Renew	Replace with a new part before installation.
Brake fluid	Use recommended brake fluid DOT3 or WELLRUN brake fluid.
Special tools	Special tools
Correct	Meaning correct installation.
Wrong	Meaning wrong installation.
Indication	Indication of components.
Directions	Indicates position and operation directions
	Components assembly directions each other.
	Indicates where the bolt installation direction, --- means that bolt cross through the component (invisibility).

General safety

Carbon monoxide

If you have to run your engine, make sure that the place is well ventilated. Never run your engine in a closed area. Run your engine in an open area, if you have to run your engine in a closed area, be sure to use an extractor.

⚠ Caution

Exhaust contains toxic gas which may cause one to lose consciousness and even result in death.

Gasoline

Gasoline is a low ignition point and explosive material. Work in a well-ventilated place, no flame or spark should be allowed in the work place or where gasoline is being stored.

⚠ Caution

Gasoline is highly flammable, and may explode under some conditions. Keep it away from children.

Used engine oil

⚠ Caution

Prolonged contact with used engine oil (or transmission oil) may cause skin cancer although it might not be verified.

We recommend that you wash your hands with soap and water right after contacting. Keep the used oil beyond reach of children.

Hot components

⚠ Caution

Components of the engine and exhaust system can become extremely hot after running. They remain very hot even after the engine has been stopped for some time. When performing service work on these parts, wear insulated gloves and wait until cooling off.

Battery

⚠ Caution

- Battery emits explosive gases; flame is strictly prohibited. Keep the places well ventilated when charging the battery.
- Battery fluid contains sulfuric acid (electrolyte) which can cause serious burns so be careful do not be spray on your eyes or skin. If you get battery fluid on your skin, flush it off immediately with water. If you get battery fluid in your eyes, flush it off immediately with water and then go to a hospital.
- If you swallow the battery fluid by mistake, drink a lot of water or milk, and take some laxative such as castor oil or vegetable oil and then go to see a doctor.
- Keep the battery fluid beyond the reach of children.

Brake pad

Do not use compressed air or a cleaning brush to clean the brake system; use a vacuum cleaner to prevent the asbestos fiber from drifting in the air.

⚠ Caution

Inhaling asbestos fiber may result in lung disease or cancer.

Brake fluid

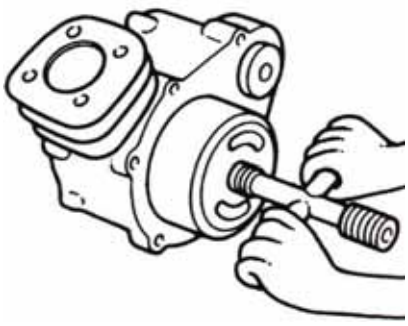
⚠ Caution

Brake fluid may cause damage to the surface of the painted parts, or even the structure of the plastic or rubber parts. Place a clean cloth for protection when servicing the brake system. Keep the brake fluid beyond reach of children.

Service Precautions

Always use with Sanyang genuine parts and recommended oils. Using non-designed parts for Sanyang motorcycle may damage the motorcycle.

Special tools are designed for remove and install of components without damaging the parts being work ed on. Using wrong tools may result in parts damaged.



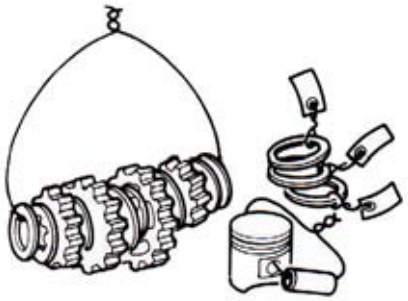
- When servicing this motorcycle, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the English system, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the motorcycle. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system to cause a damage.

Wash and clean parts with high ignition point solvent, and blow dry with compressed air. Pay special attention to O-rings or oil seals because most cleaning agents have an adverse effect on them.

Never bend or twist a control cable to prevent unsmooth control and premature worn out.

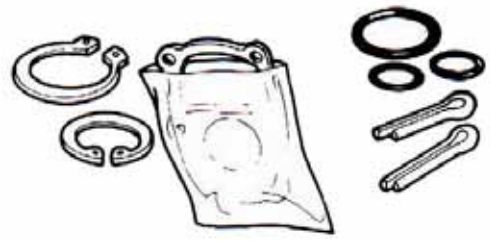
- Rubber parts may become deteriorated when old, and prone to be damaged by solvent and oil. Check these parts before installation to make sure that they are in good condition, replace if necessary.
- When loosening a component which has different sized fasteners, operate with a diagonal pattern and work from inside out. Loosen the small fasteners first. If the bigger ones are loosen first, small fasteners may receive too much stress.

Store complex components such as transmission parts in the proper assemble order and tie them togethe r with a wire for ease of installation later.

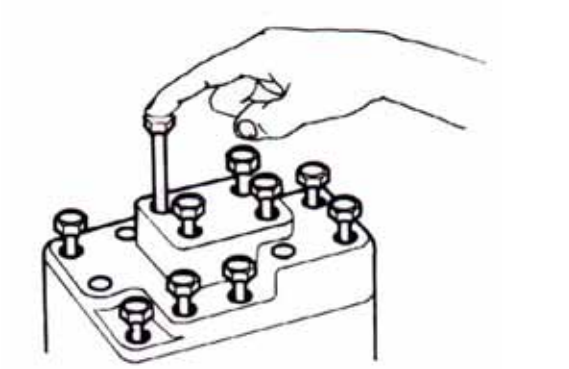


- Note the reassemble position of the important components before disassembling them to ensure they wil l be reassembled in correct dimensions (depth, distance or position).

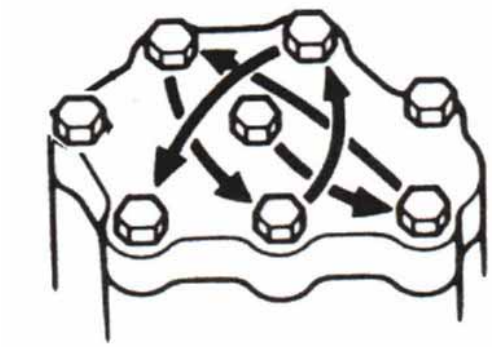
Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap rings, and split pins.



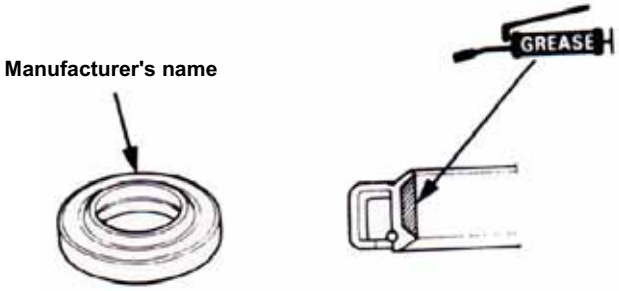
The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length out side the hole is the same with other bolts, it is a correct bolt. Bolts for the same assembly should have the same length.



Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unles s otherwise indicated. Bolts and fasteners should be kept clean and dry. Do not apply oil to the threads.

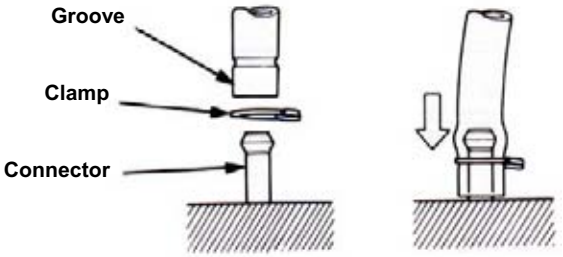


When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.

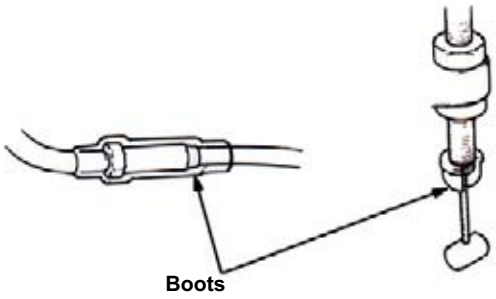


- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.

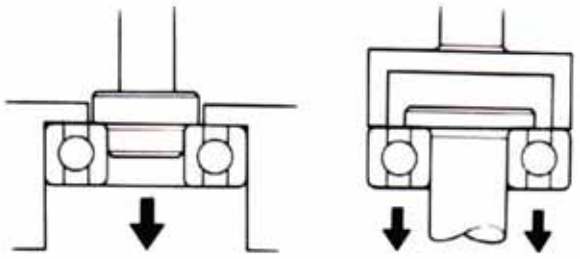
The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the en larged ends for tightening the clamps.



Rubber and plastic boots should be properly reinstalled to the original correct positions as designed.

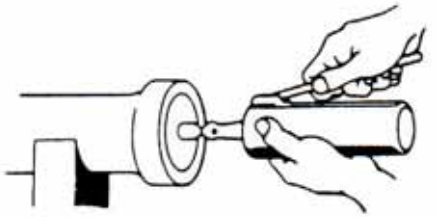


The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both races.



Both of these examples can result in bearing damage.

Lubricate the rotation face with specified lubricant on the lubrication points before assembling.

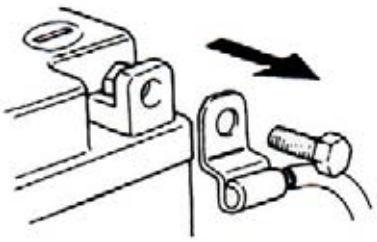


Check if positions and operation for installed parts is in correct and properly.

Make sure service safety each other when conducting by two persons.

Note that do not let parts fall down.

Before battery removal operation, it has to remove the battery negative (-) cable firstly. Notre tools like open-end wrench do not contact with body to prevent from circuit short and create sp ark.



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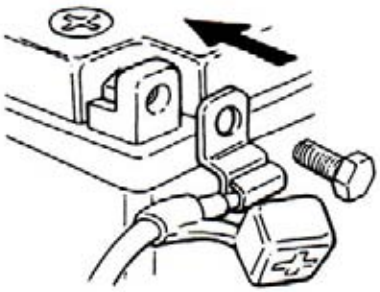
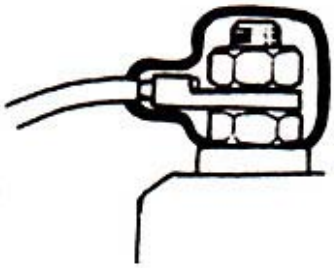
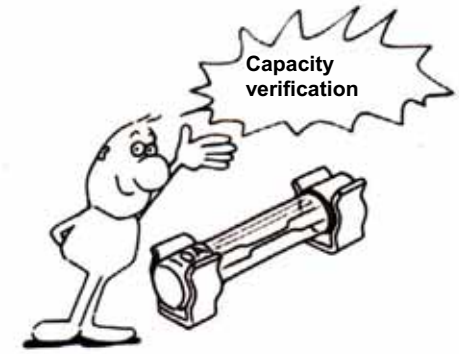
- After service completed, make sure all connection points is secured. Battery positive (+) cable should be connected firstly.
  And the two posts of battery have to be greased after connected the cables.



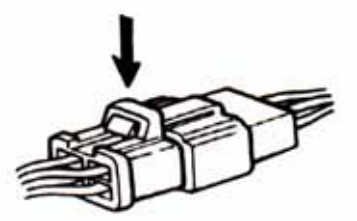
Make sure that the battery post caps are located in properly after the battery posts had been service d.



If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.

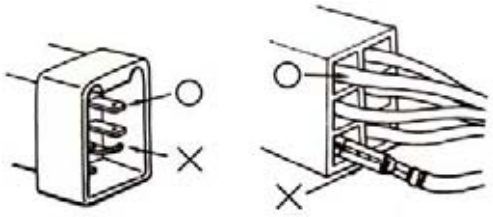


When separating a connector, it locker has to be unlocked firstly. Then, conduct the service operation.

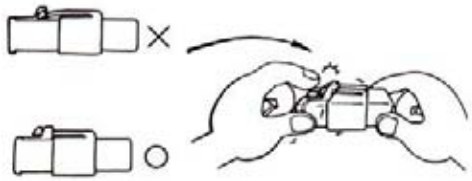


Do not pull the wires as removing a connector or wires. Hold the connector body.

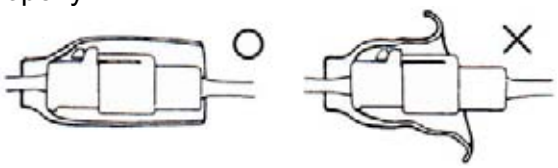
Make sure if the connector pins are bent, extruded or loosen.



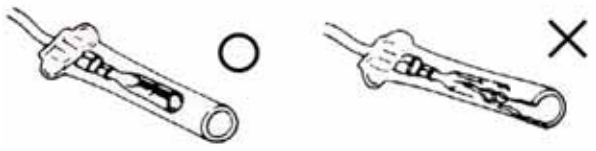
- Insert the connector completely. If there are two lockers on two connector sides, make sure the lockers are locked in properly.
  Check if any wire loose.



- Check if the connector is covered by the twin connector boot completely and secured properly.

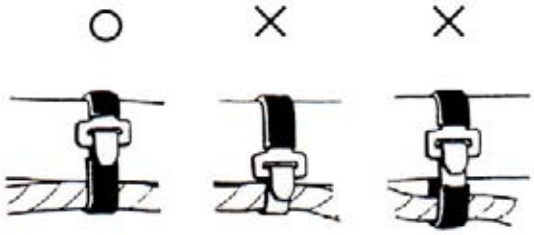


- Before terminal connection, check if the boot is crack or the terminal is loose.

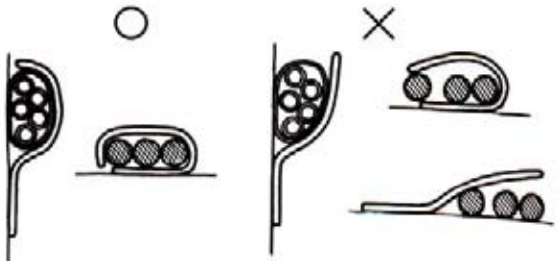


- Insert the terminal completely.
  Check if the terminal is covered by the boot.
  Do not let boot open facing up.

- Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.

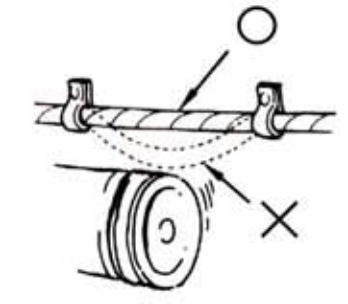


- Wire band and wire harness have to be clamped secured properly.

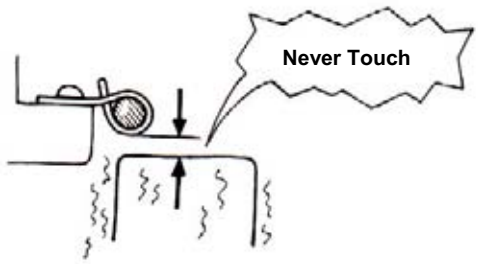


- Do not squeeze wires against the weld or its clamp.

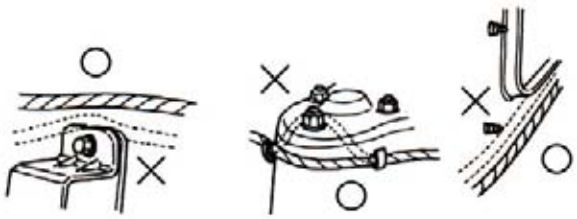
- Do not let the wire harness contact with rotating, moving or vibrating components as routing the harness.



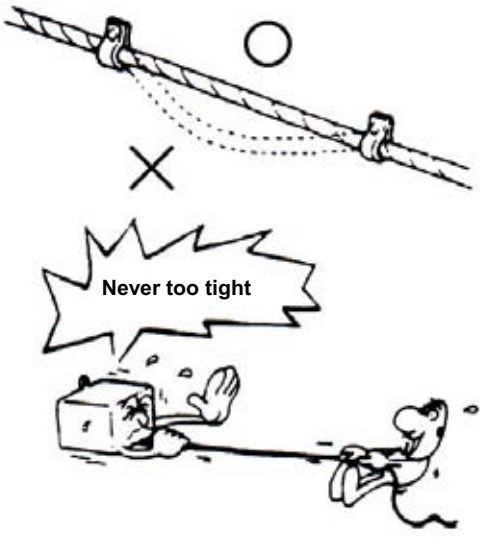
- Keep wire harnesses far away from the hot parts.



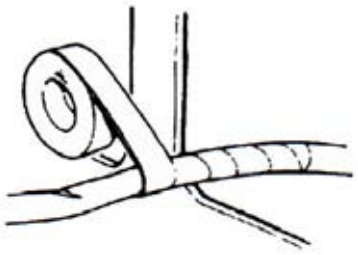
- Route wire harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



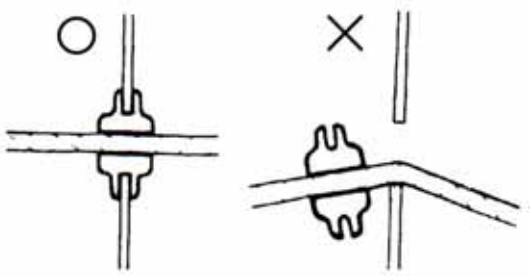
- Route harnesses so that they neither pull too tight nor have excessive slack.



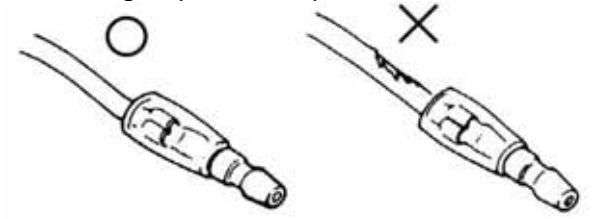
- Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



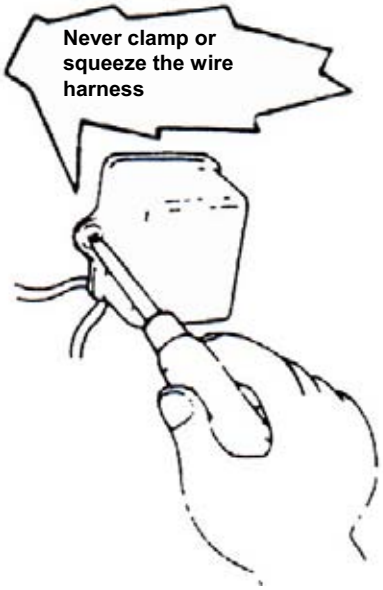
- Secure the rubber boot firmly as applying it on wire harness.



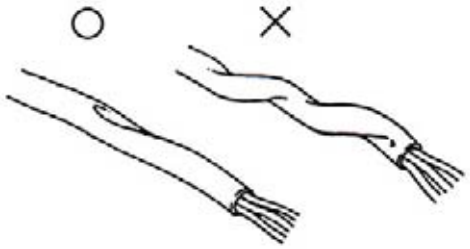
- Never use wires or harnesses which insulation has been broken. Wrap electrical tape around the damaged parts or replace them.



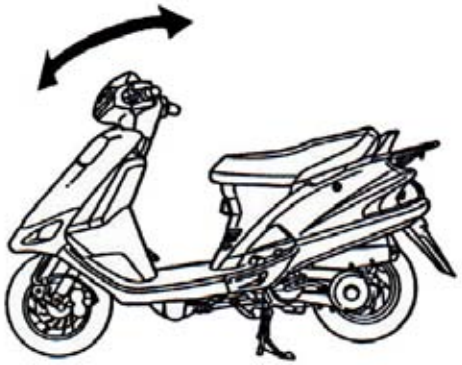
- Never clamp or squeeze the wire harness as installing other components.



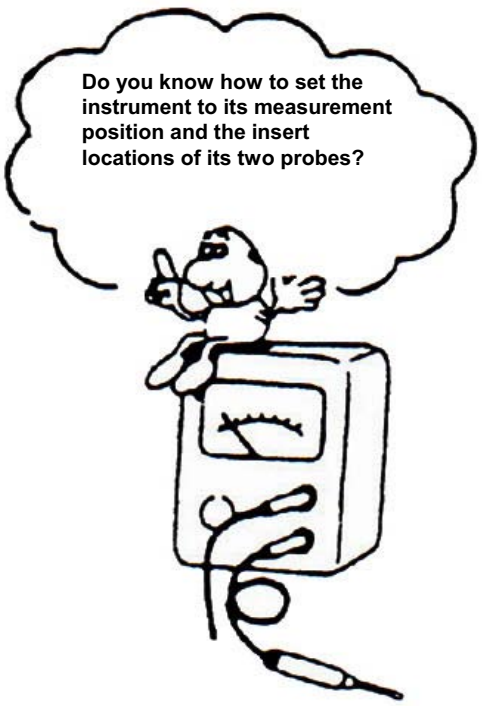
- Do not let the wire harness been twisted as installation.



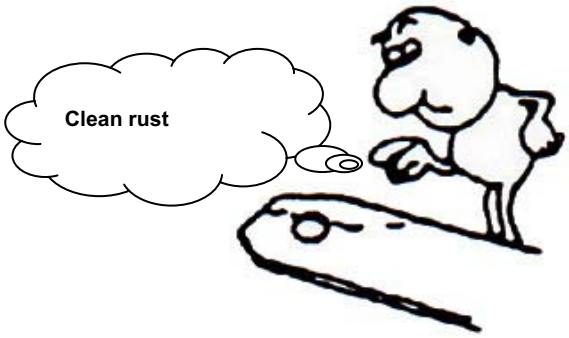
- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, be rubbed against or interfere with adjacent or surrounding parts in all steering positions.



- Before operating a test instrument, operator should read the operation manual of the instrument. And then, conduct test in accordance with the instruction.



- With sand paper to clean rust on connector pins/terminals if found. And then conduct connection operation later.



Specifications

MAKER			SANYANG	MODEL		LH30W-6
Dimension	Overall Length		2210 mm	Suspension System	Front	Telescopic Fork
	Overall Width		785 mm		Rear	Unit Swing
	Overall Height		1445 mm	Tire Specifications	Front	110 /70-16 52P
	Wheel Base		1500 mm		Rear	140 /70-16 65P
Weight	Curb Weight	Front	77 kg	Brake System	Front	Disk (φ 260 mm)
		Rear	107 kg		Rear	Disk (φ 260 mm)
		Total	184 kg			
	Passengers/Weight		Two /150 kg	Performance	Max. Speed	Above 128 km/hr
	Total Weight	Front	104 kg		Climb Ability	Below 27°
		Rear	230 kg	Reduction	Primary Reduction	Belt
		Total	334 kg		Secondary Reduction	Gear
Engine	Type		4-Stroke Engine		Clutch	Centrifugal, dry type
	Installation and arrangement		Vertical, below center, incline 80°		Transmission	C.V.T.
	Fuel Used		Unleaded gasoline	Speedometer		0 ~ 160 km/hr
	Cycle/Cooling		4-stroke/water cooled	Horn		93~112 dB/A
	Cylinder	Bore	73 mm	Muffler		Expansion & Pulse Type
		Stroke	62.8 mm	Exhaust Pipe Position and Direction		Right side, and Backward
		Number/Arrangement	Single Cylinder	Lubrication System		Forced circulation & splashing
	Displacement		262.8 cc	Exhaust Concentration	Solid Particulate	
	Compression Ratio		10.0 : 1		CO	Below 2.0 g/ km
	Max. HP		15.4 kw / 7000 rpm		HC	Below 0.3g/ km
	Max. Torque		23.5 Nm / 5500 rpm	EEC		V
	Ignition		Full transistor Ignition(ECU)	PCV		V
	Starting System		electrical starter	Catalytic Converter		V

Torque Values

The torque values listed in above table are for more important tighten torque values. Please see standard values for not listed in the table.

Standard Torque Values for Reference

Type	Tighten Torque	Type	Tighten Torque
5 mm bolt、nut	0.45~0.6kgf-m	5 mm screw	0.35~0.5kgf-m
6 mm bolt、nut	0.8~1.2kgf-m	6 mm screw、SH nut	0.7~ 1.1kgf-m
8 mm bolt、nut	1.8~2.5kgf-m	6 mm bolt、nut	1.0 ~1.4kgf-m
10 mm bolt、nut	3.0~4.0kgf-m	8 mm bolt、nut	2.4 ~3.0kgf-m
12 mm bolt、nut	5.0~6.0kgf-m	10 mm bolt、nut	3.5~4.5kgf-m

Engine Torque Values

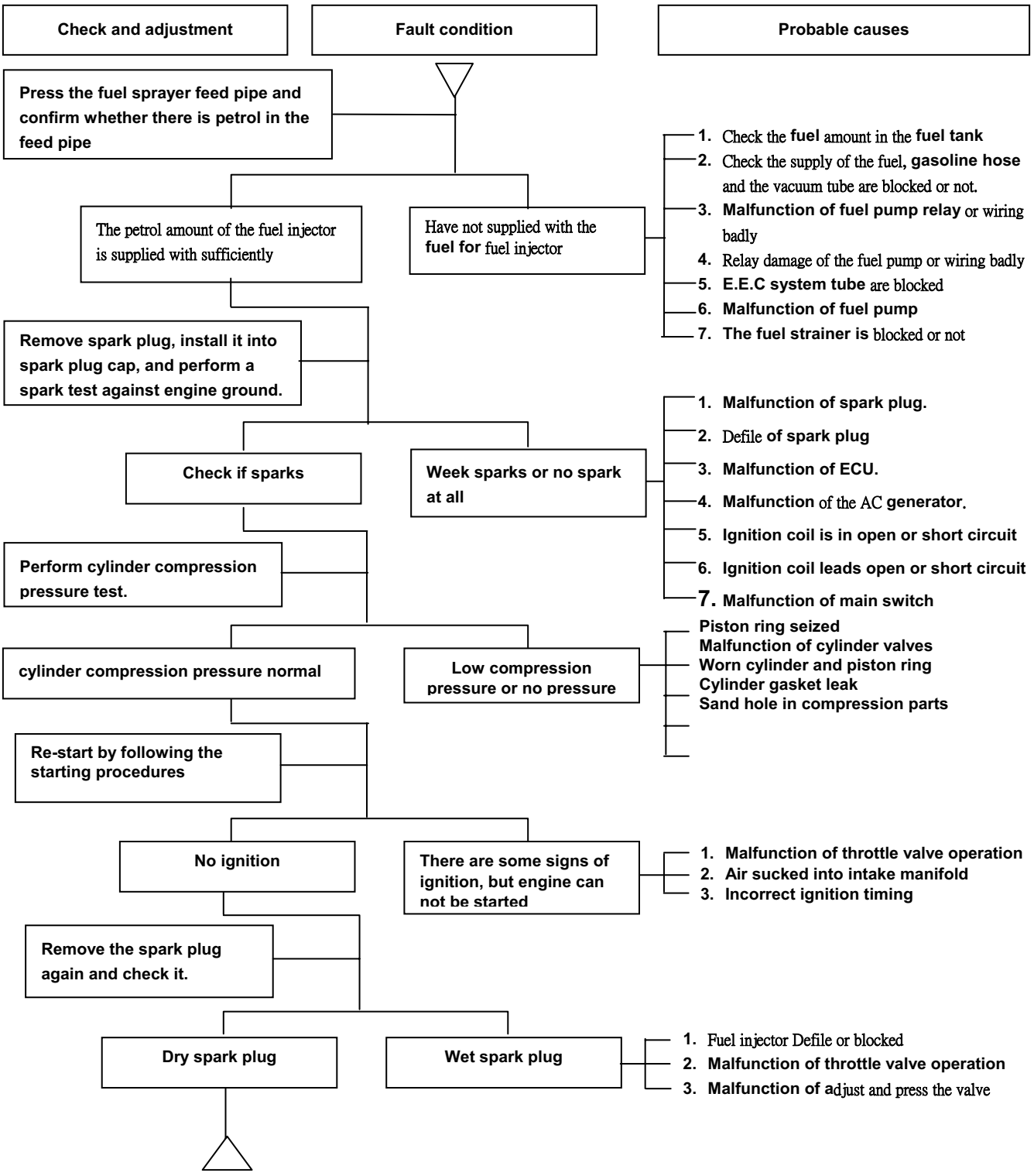
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Cylinder head nut	4	8	2.0~2.4	
Cylinder head right bolt	2	8	2.0~2.4	
Cylinder head stud bolt (inlet pipe)	2	6	0.7~1.1	
Cylinder head stud bolt (EX. pipe)	2	7	0.5~1.0	
Tappet adjustment hole cap bolt	6	6	1.0~1.4	
Tappet adjustment screw nut	4	5	0.7~1.1	Apply oil to thread
Spark plug	1	10	1.0~1.2	
Carburetor insulator bolt	2	6	0.7~1.1	
Cylinder stud bolt	4	8	0.7~1.1	
Engine left cover bolt	7	6	1.1~1.5	
Engine oil draining bolt	1	12	1.1~1.5	
Engine oil strainer cap	1	30	1.3~1.7	
Mission draining bolt	1	8	0.8~1.2	
Mission filling bolt	1	10	0.8~1.2	
Clutch driving plate nut	1	28	5.0~6.0	
Clutch outer nut	1	12	5.0~6.0	
Drive face nut	1	12	5.0~6.0	
Flywheel nut	1	12	5.0~6.0	
Crankcase bolts	7	6	0.8~1.2	
Mission case bolt	7	8	2.0~2.4	

Frame Torque Values

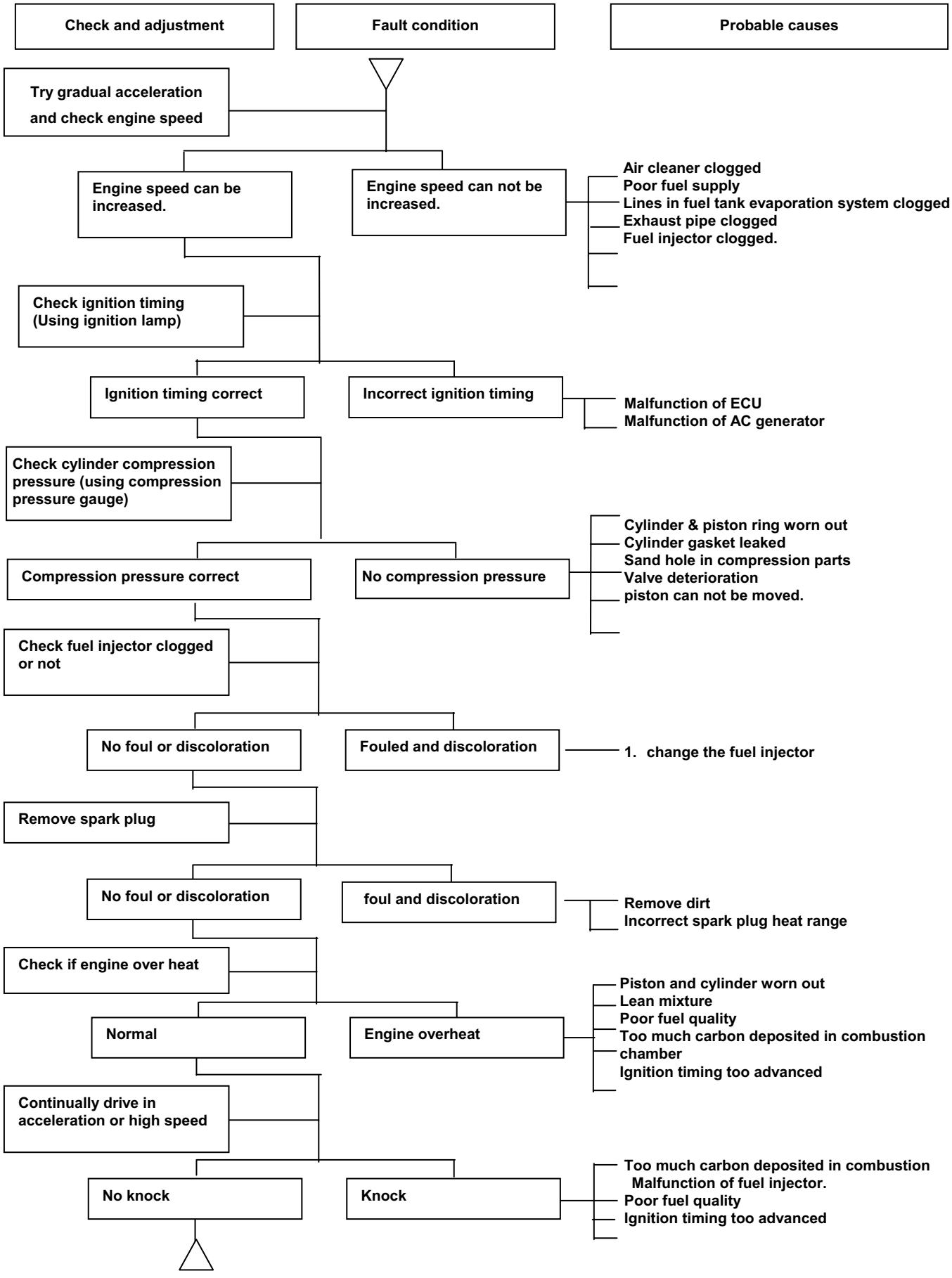
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Stopper nut for engine hanger rubber	1	8	1.8~2.2	
Engine hanger nut	2	12	4.0~5.0	
Engine hanger bolt	1	12	4.0~5.0	
Engine connection bolt	1	10	3.5~4.5	
Front wheel axle nut	1	12	5.0~7.0	
Rear wheel shaft nut	1	14	10.0~12.0	
Rear fork	2	8	4.0~5.0	
Rear cushion upper bolt	2	10	3.5~4.5	
Rear cushion under bolt	2	8	2.4~3.0	
Nut for steering post	1	10	4.0~5.0	
Front cushion	4	8	2.4~3.0	
Brake lever nut	2	6	0.8~1.2	
Nut for the rear brake arm	1	6	0.5~0.6	
Front brake hose bolt	4	10	3.0~4.0	
Front brake caliper bolt	4	6	3.0~3.5	
Front brake disk mounting bolt	7	8	4.0~4.5	
Air-bleed valve	1	5	0.5~0.6	
Speedometer cable locking screw	1	5	0.15~0.3	
Exhaust muffler bolt	3	8	3.2~3.8	
Exhaust muffler connection nut	2	7	1.0~1.2	

Troubles Diagnosis (Electronic Fuel Injection System)

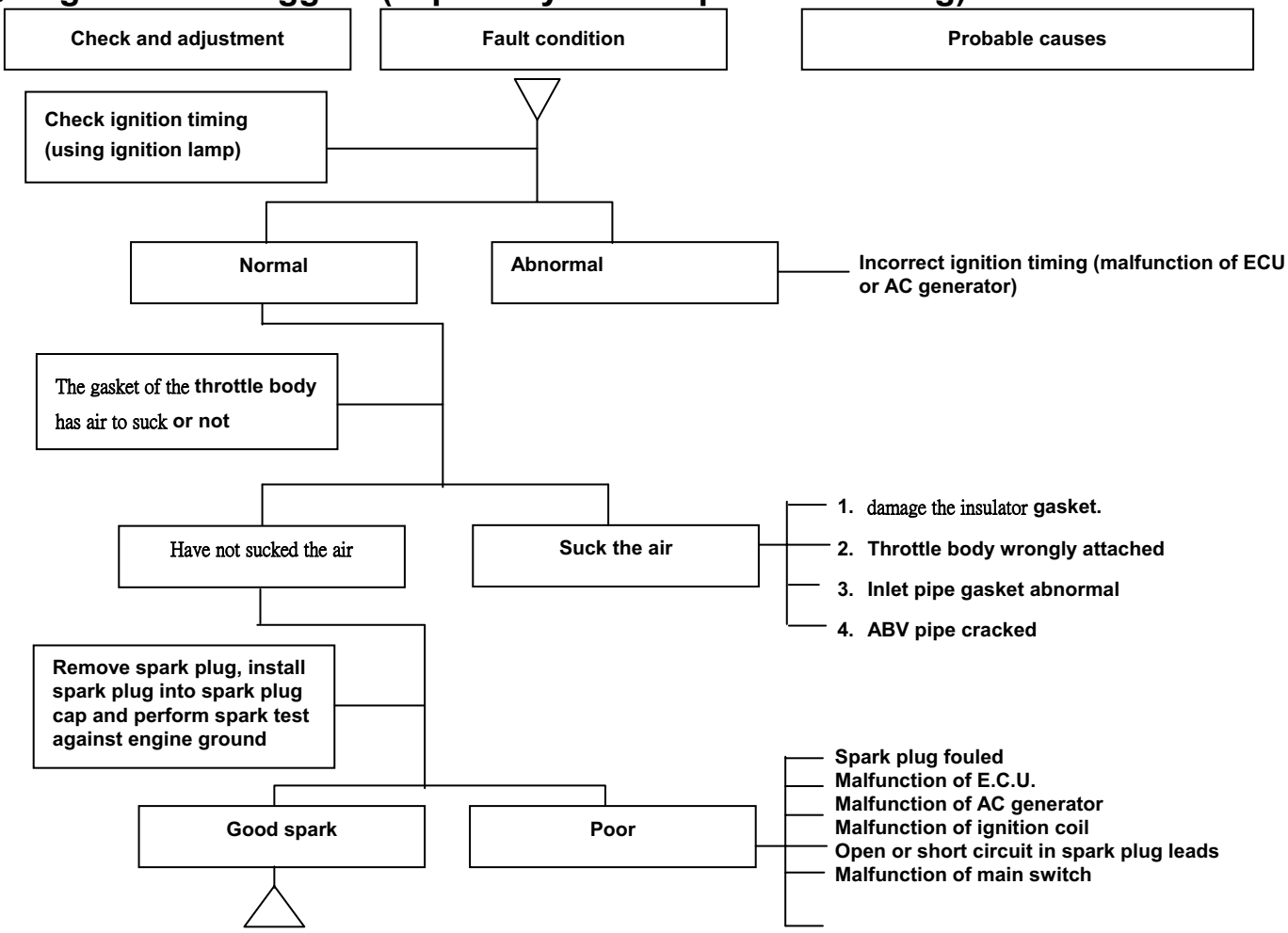
A. Engine cannot be started or difficult to be started


Check and adjustment
Fault condition
Probable causes
Press the fuel sprayer feed pipe and confirm whether there is petrol in the feed pipe
The petrol amount of the fuel injector is supplied with sufficiently
Have not supplied with the fuel for fuel injector
1. Check the fuel amount in the fuel tank
2. Check the supply of the fuel, gasoline hose and the vacuum tube are blocked or not.
3. Malfunction of fuel pump relay or wiring badly
4. Relay damage of the fuel pump or wiring badly
5. E.E.C system tube are blocked
6. Malfunction of fuel pump
7. The fuel strainer is blocked or not
Remove spark plug, install it into spark plug cap, and perform a spark test against engine ground.
Check if sparks
Week sparks or no spark at all
1. Malfunction of spark plug.
2. Defile of spark plug
3. Malfunction of ECU.
4. Malfunction of the AC generator.
5. Ignition coil is in open or short circuit
6. Ignition coil leads open or short circuit
7. Malfunction of main switch
Perform cylinder compression pressure test.
cylinder compression pressure normal
Low compression pressure or no pressure
Piston ring seized
Malfunction of cylinder valves
Worn cylinder and piston ring
Cylinder gasket leak
Sand hole in compression parts
Re-start by following the starting procedures
No ignition
There are some signs of ignition, but engine can not be started
1. Malfunction of throttle valve operation
2. Air sucked into intake manifold
3. Incorrect ignition timing
Remove the spark plug again and check it.
Dry spark plug
Wet spark plug
1. Fuel injector Defile or blocked
2. Malfunction of throttle valve operation
3. Malfunction of adjust and press the valve

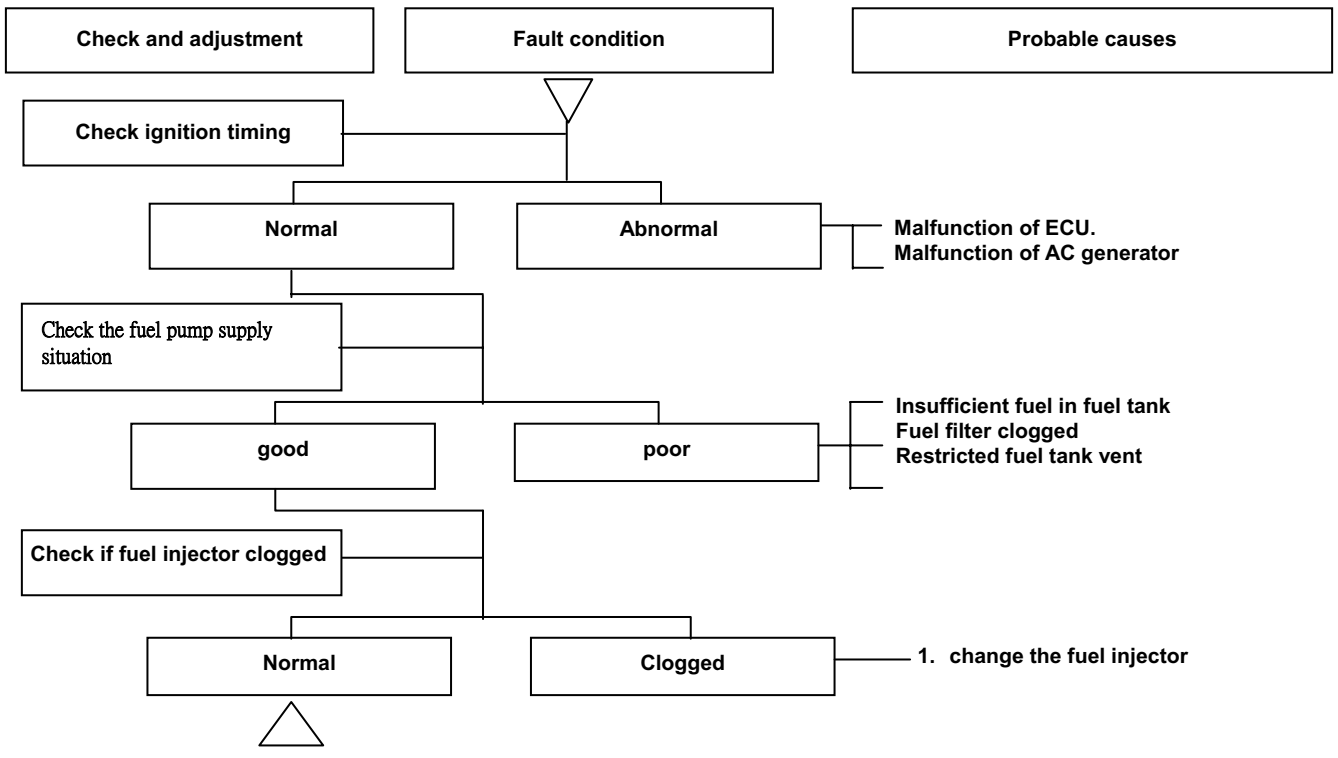
B. Engine run sluggish (Speed does not pick up, lack of power)



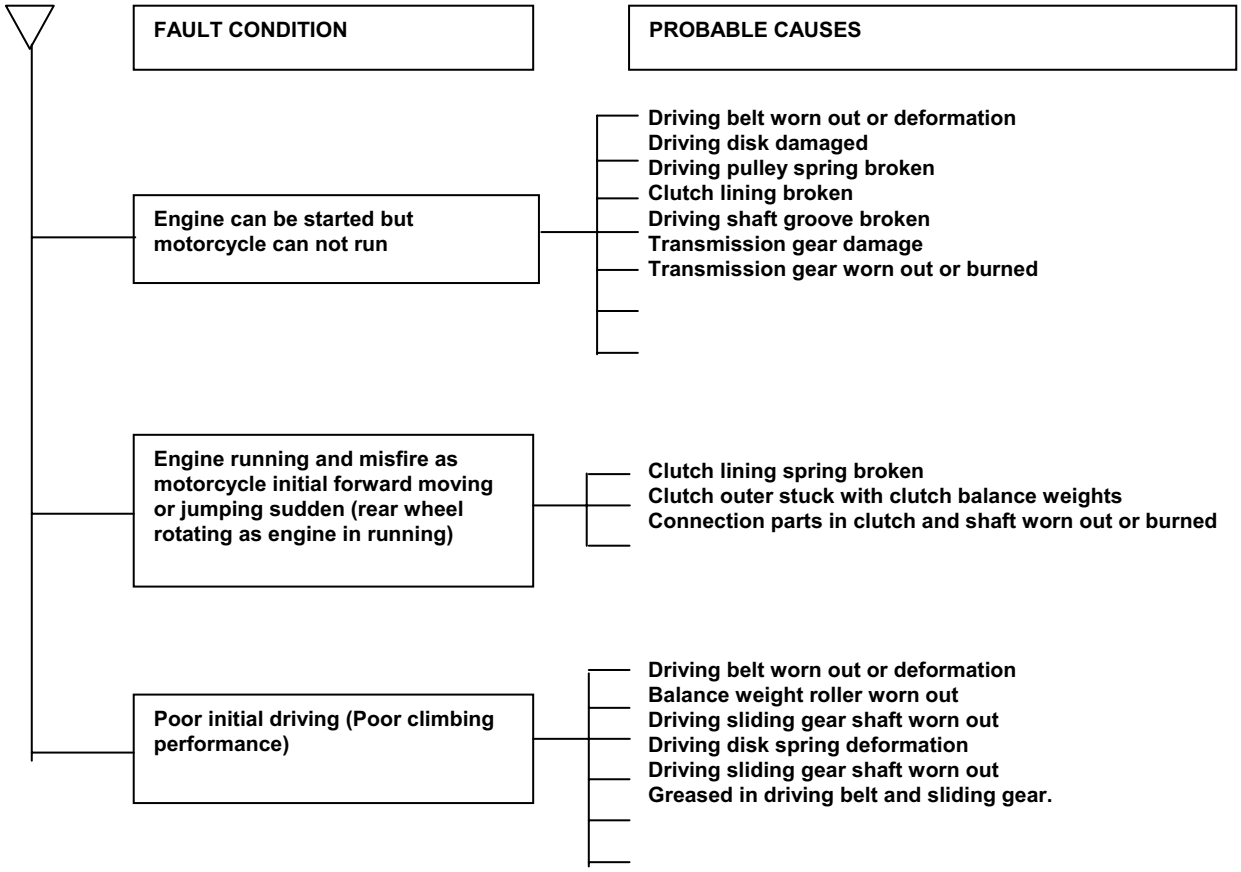
C. Engine runs sluggish (especially in low speed and idling)


Check and adjustment
Fault condition
Probable causes
Check ignition timing (using ignition lamp)
Normal
Abnormal
Incorrect ignition timing (malfunction of ECU or AC generator)
The gasket of the throttle body has air to suck or not
Have not sucked the air
Suck the air
1. damage the insulator gasket.
2. Throttle body wrongly attached
3. Inlet pipe gasket abnormal
4. ABV pipe cracked
Remove spark plug, install spark plug into spark plug cap and perform spark test against engine ground
Good spark
Poor
Spark plug fouled
Malfunction of E.C.U.
Malfunction of AC generator
Malfunction of ignition coil
Open or short circuit in spark plug leads
Malfunction of main switch

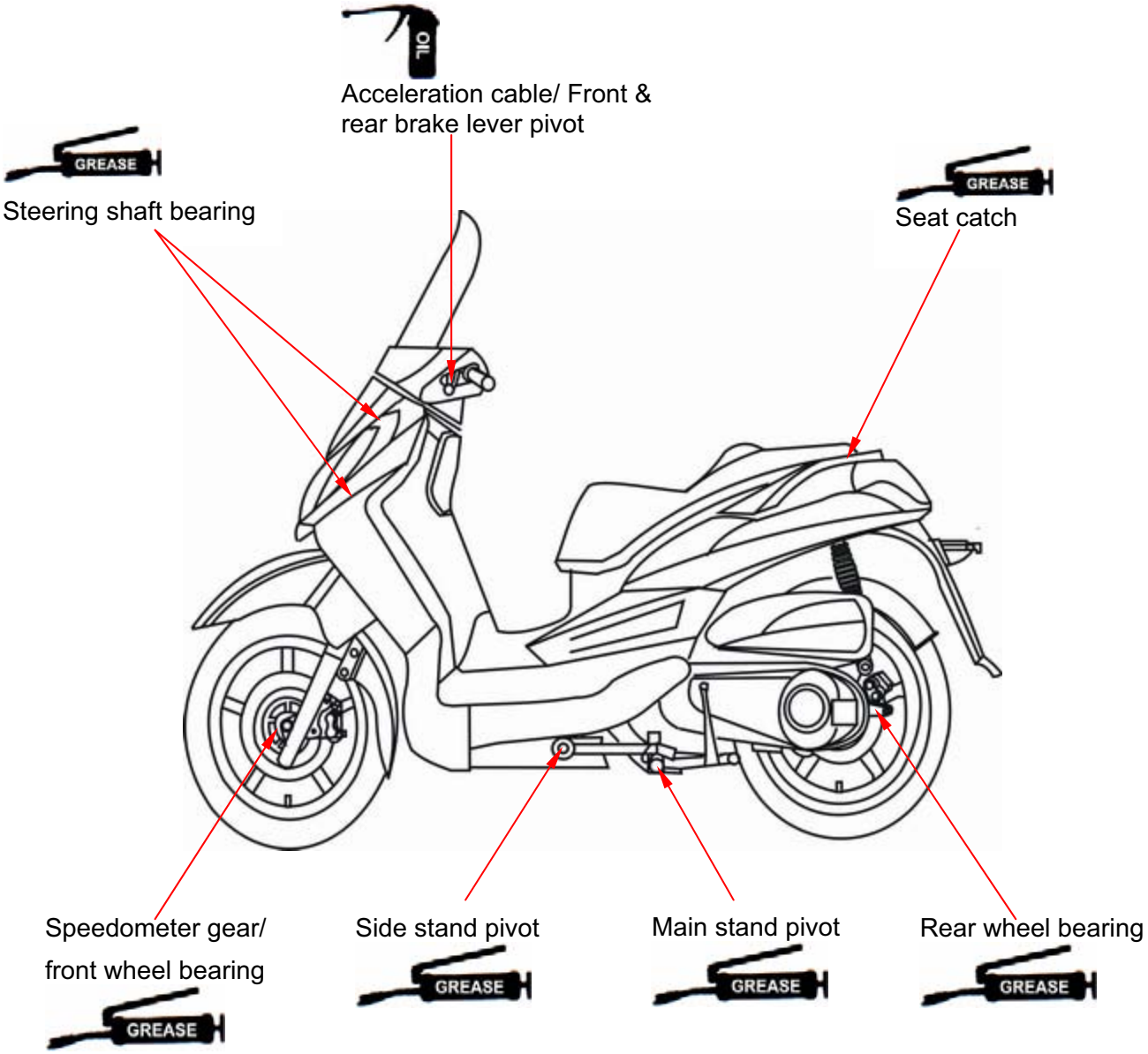
D. Engine runs sluggish (High speed)



E. CLUTCH AND DRIVING PULLEY


FAULT CONDITION
PROBABLE CAUSES
Engine can be started but motorcycle can not run
Driving belt worn out or deformation
Driving disk damaged
Driving pulley spring broken
Clutch lining broken
Driving shaft groove broken
Transmission gear damage
Transmission gear worn out or burned
Engine running and misfire as motorcycle initial forward moving or jumping sudden (rear wheel rotating as engine in running)
Clutch lining spring broken
Clutch outer stuck with clutch balance weights
Connection parts in clutch and shaft worn out or burned
Poor initial driving (Poor climbing performance)
Driving belt worn out or deformation
Balance weight roller worn out
Driving sliding gear shaft worn out
Driving disk spring deformation
Driving sliding gear shaft worn out
Greased in driving belt and sliding gear.

Parts to Be Greased



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Precautions in Operation

Specification

Fuel Tank Capacity		10,000 c.c.
Engine Oil	capacity	1,400 c.c.
	change	1,200 c.c.
Transmission Gear oil	capacity	180 c.c.
	change	160 c.c.
Capacity of coolant (Engine + radiator +Reservoir upper)		1400 c.c.
Clearance of throttle valve		2~6 mm
Spark plug		CR8E (gap:0.6~0.7 mm)
〝F〞 Mark in idling speed		BTDC 10º / 1,650 rpm
Full timing advanced		BTDC 30º
Idling speed		1,650±100 rpm
Cylinder compression pressure		12 ± 2 Kg/cm²
Valve clearance	IN	0.1±0.02 mm
	EX	0.15±0.02 mm
Tire dimension	Front	110/70-16 52P
Tire dimension	Rear	140/70-16 65P
Tire pressure (cold)	single	Front: 1.75 Kg/cm² Rear: 2.0 Kg/cm²
	Load 90 Kg (full load)	Front: 2.0 Kg/cm² Rear: 2.25 Kg/cm²
Battery		12V10Ah (MF battery) / YTX12-BS

Periodical Maintenance Chart

No	item	Every 300KM	1 Month every 1,000KM	3 month every 3,000KM	6 month every 6,000KM	1 year every 12,000KM
1	☆Air cleaner	I		C	C	R
2	☆2nd air jet cleaner	I		C	C	R
3	☆Fuel filter	I			I	R
4	☆Oil filter	C			C	C
5	☆Engine oil change	R	Replacement for every 1,000 km			
6	Tire pressure	I	I	I	I	I
7	Battery inspection	I	I	I	I	I
8	Brake & free ply check	I	I	I	I	I
9	Steering handle check	I			I	I
10	Cushion operation check	I			I	I
11	Every screw tightening check	I	I	I	I	I
12	Gear oil check for leaking	I	I	I	I	I
13	☆Spark plug check or change	I		I	R	R
14	☆Gear oil change	R	Replacement for every 5,000 km			
15	Frame lubrication				L	L
16	Exhaust pipe	I	I	I	I	I
17	☆Ignition timing	I	I	I	I	I
18	☆emission check in Idling	A	I	I	I	I
19	☆Throttle operation	I		I	I	I
20	☆Engine bolt tightening	I		I	I	I
21	☆CVT driving device(belt)				I	R
22	☆CVT driving device(roller)				C	C
23	Lights/electrical equipment/multi-meters	I	I	I	I	I
24	Main/side stands & springs	I			I	I
25	Fuel lines	I		I	I	I
26	Shock absorbers			I	I	I
27	Cam chain	I		I	I	I
28	☆Valve clearance	I		A	A	A
29	☆Crankcase evaporative control system	I		C	C	C
30	☆Crankcase blow-by over-flow pipe		Replacement for every 2,000 km			
31	☆2nd air jet system	I		I	C	C
32	☆Evaporative control system			I	I	I
33	Lines & connections in cooling system	I	I	I	I	I
34	Coolant reserve tank	I	I	I	I	I
35	Coolant	I	Replace			
36	ECU input voltage signal				I	
37	EMS sensor couplers	I		I		

Code: I ~ Inspection, cleaning, and adjustment R ~ Replacement C ~ Cleaning (replaced if necessary) L ~ Lubrication
Have your motorcycle checked, adjusted, and recorded maintenance data periodically by your SYM Authorized Dealer to maintain the motorcycle at the optimum condition
The above maintenance schedule is established by taking the monthly 1,000 kilometers as a reference which ever comes first.
Remarks: 1. **These marks "☆" in the schedule are emission control items. According to EPA regulations, these items must be performed normally periodical maintenance following the use r manual instructions. They are prohibited to be adjusted or repaired by unauthorized people. Otherwise, SYM is no responsible for the charge.**
2. Clean or replace the air cleaner element more often when the motorcycle is operated on dusty roads or in the Heavily- polluted environment.
3. Maintenance should be performed more often if the motorcycle is frequently operated in high speed and after the motorcycle has accumulated a higher mileage.
4. Preventive maintenance
   a. Ignition system－Perform maintenance and check when continuous abnormal ignition, misfire, after-burn, overheating occur.
   b. Carbon deposit removal－Remove carbon deposits in cylinder head, piston heads, exhaust system when power is obvious lower. Than ever
   c. Replace worn out pistons, cylinder head.

Engine Oil

Turn off the engine, and situate the motorcycle vertically by main stand.
Check the oil level with oil filler plug.
Do not screw the oil filler plug into the engine when checking.
If oil level is nearly low level, pour in the recommended oil to the upper level.

Oil Change

⚠ Caution

- Drain oil as engine warmed up to make sure oil can be drained smoothly and completely.

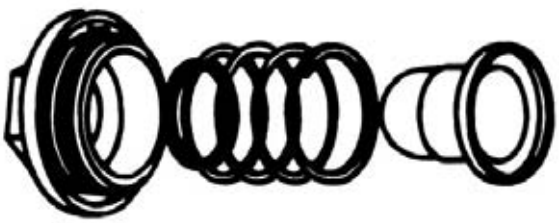
Place an oil pan under the engine, and remove the oil drain bolt.
After draining oil, make sure the drain bolt gasket can be re-used.
Tighten the oil drain bolt.
Torque value: 3.5~4.5kgf-m
Pour in the oil (viscosity SAE 10W-30)
Recommended oil: King series oil.
Engine oil capacity:

Disassembly	**1400c.c.**
Replacement	**1200c.c.**

Screw the oil filler plug; start the engine and run it for several minutes.
Turn off the engine, and check the oil level again.
Check if the engine oil leaks or not.

Engine Oil Strainer

Drain the engine oil.
Unscrew the oil filter cap and remove the oil strainer and the spring.
Clean the oil strainer.
Check if the O-ring can be re-used or not.
Install the oil strainer and the spring.
Tighten the oil filter cap.
Torque value : 1.3~1.7kgf-m



Gear Oil

Situate the motorcycle vertically by the main stand.
Turn off the engine.
Inspect the gear oil level through the oil inspection bolt.

Gear Oil Change

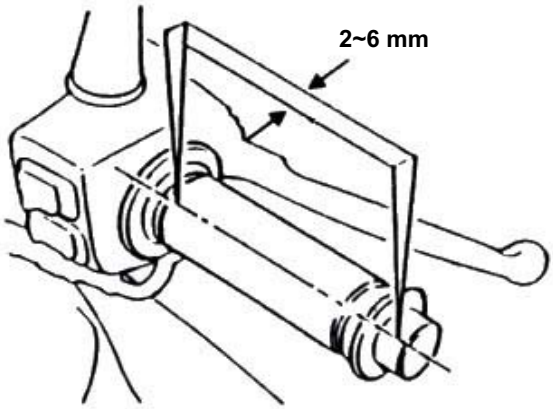
Unscrew the gear oil filler bolt.
Unscrew the drain bolt and drain the gear oil.
Screw the drain bolt.
Torque value: 0.8~1.2kgf-m
Pour in the specified type and amount of gear oil.
Screw the oil filler bolt.
Torque value: 1.0~1.4kgf-m
Gear Oil Capacity: 170 cc.
Make sure that the bolt washer can be re-used.
Start engine and run the engine for 2-3 minutes.
Make sure that no oil leaking.

Fuel Line / Cable

Remove luggage box.
Remove rear carrier.
Remove body covers.
Remove floor panel.
Check all lines, and replace them when they are deteriorated, damaged or leaking.

⚠ Warning

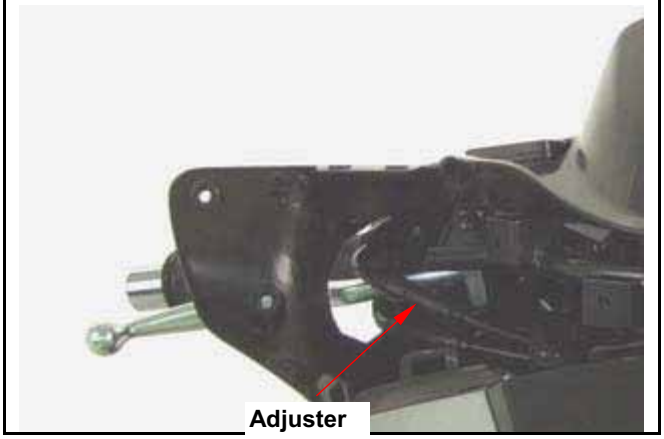
- Gasoline is a low flashpoint fuel, so any fire is strictly prohibited when dealing with it.



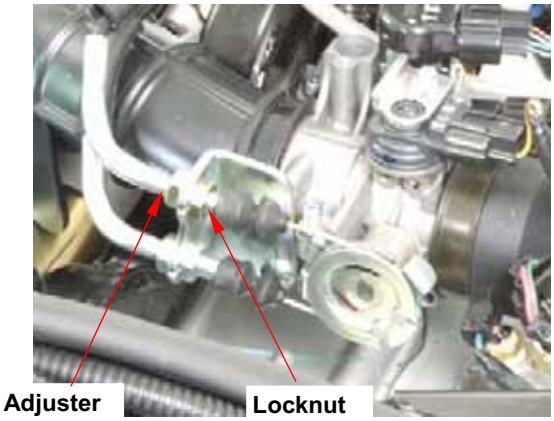
Throttle Control System

Check if the throttle grip operation is smooth or not.
Check the throttle cable and replace it if it's deteriorated, twisted or damaged.
Lubricate the cable if operation is not smooth
Measure the throttle grip free play.
Throttle grip free play: 2~6 mm.

Adjustment can be carried out at both ends of the throttle cable.
Loosen the locknut, and then adjust the throttle grip free play by turning the adjuster.



Primary adjustment should be carried out from bottom end of the throttle cable.
Loosen the locknut, and adjust by turning the adjuster.
Tighten the locknut, and check throttle operation condition.



Air Cleaner

Air Cleaner Element

Remove 9 screws from the air cleaner cover and then remove the cover.

Remove the air cleaner element.

⚠ Caution

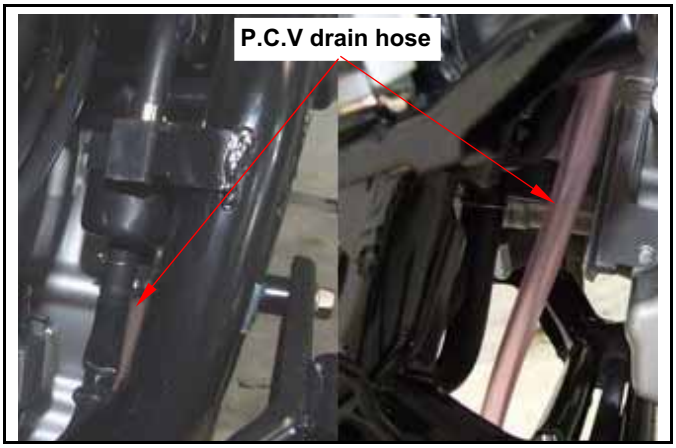
- The air cleaner element is made of paper, so do not wash it by water or solvent.

P.C.V. system

Remove the plug from the P.C.V. drain hose. Drain the internal deposit and reinstall the plug. Inspection should be carried out every 2,000 kilometers.

⚠ Caution

- The P.C.V. drain hose is transparent so that the deposit is visible.
- Inspection of the P.C.V drain hose should be carried out more often in the rainy place or under the situation of full throttle frequently.

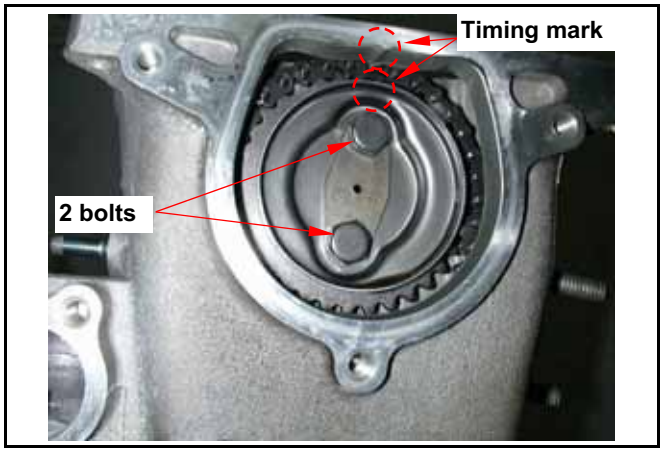


Valve Clearance

⚠ Caution

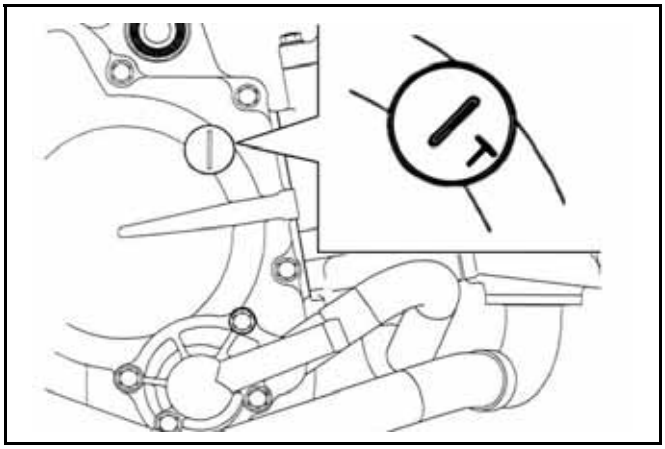
- Inspection and adjustment should be carried out when the engine temperature is under 35 ℃.

Remove the luggage box.
Remove the cylinder head cover & the side cover.
Remove ignition timing inspection cap located on the right cover of the engine.
Turn the camshaft bolt clockwise and let the “T” mark on the camshaft sprocket align with the cylinder head mark so that piston is placed at TDC in compression stroke.



⚠ Caution

- Do not turn the bolt counterclockwise to prevent the camshaft bolt from loosening.



Valve clearance inspection and adjustment:
Check & adjust valve clearance with thickness gauge.
Valve clearance (IN)：0.1±0.02 mm.
Valve clearance (EX)：0.15±0.02 mm.
Loosen fixing nut and turn the adjustment nut for adjustment.

⚠ Caution

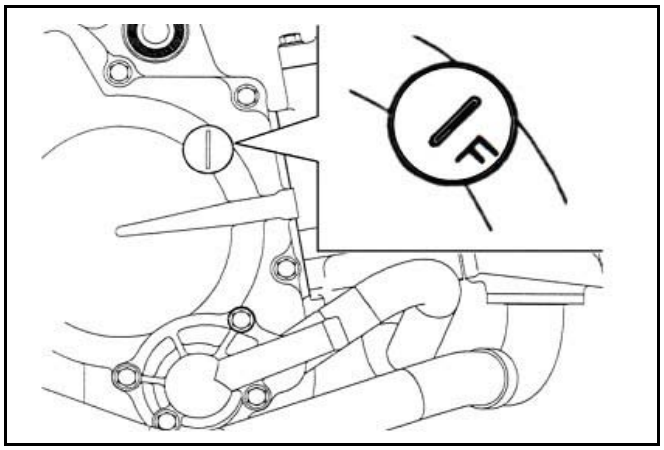
- Re-check the valve clearance after tightened the fixing nut.

Special tool: Tappet adjuster
SYM-9001200-08
SYM-9001200-09
SYM-9001200-10
Special tool: Tappet adjuster wrench
SYM-9001200

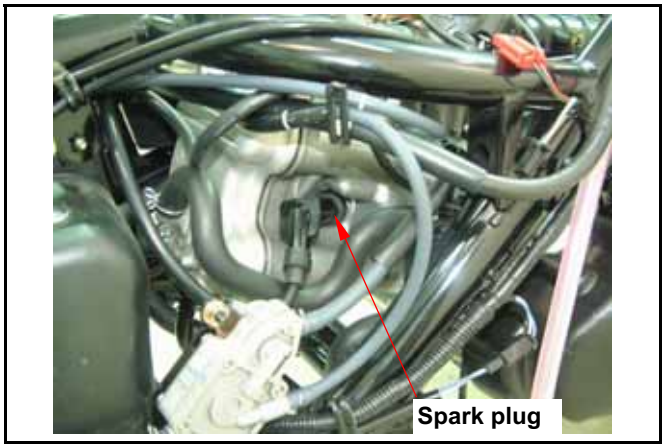
Ignition System

⚠ Caution

- Ignition system is set by the manufacturer so it can not be adjusted.
- Ignition timing check procedure is for checking whether CDI function is normal or not.

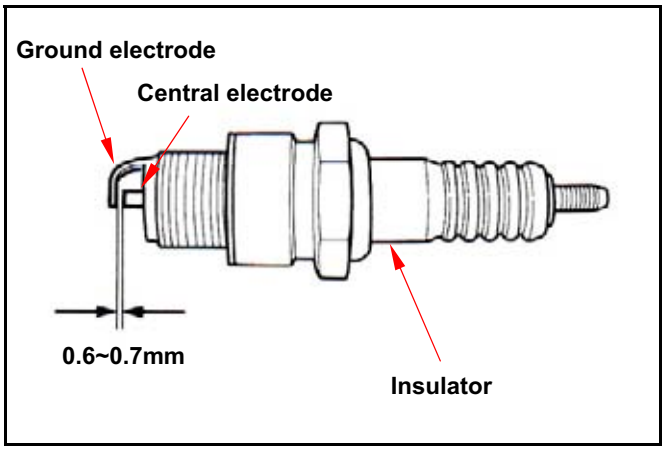


Remove right side cover.
Remove ignition timing inspection cap located on the right cover of the engine.
Connect the tachometer and the ignition timing light.
Start the engine.
Keep the engine at 2,500 rpm; check the “F” mark with the ignition timing light and see if it aligns with the timing mark.
If so, it means that ignition timing is correct.
Increase engine speed to 6,000 rpm to check ignition advance degree. If the timing is located within the ignition advance degrees, it means that the ignition advance degree is correct.
If the ignition timing is incorrect, check ECU, flywheel and crankshaft position sensor.
Replace it if the malfunction of these parts is found.



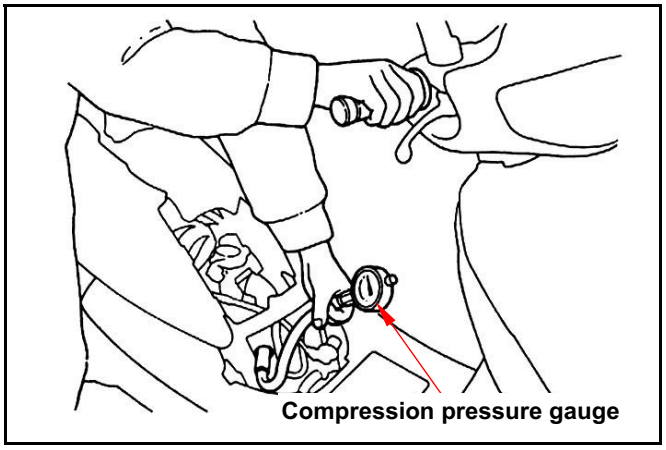
Spark Plug

Recommended spark plug: CR8E
Remove the luggage box.
Remove the central cover.
Remove the spark plug cap.
Clean dirt around the spark plug hole.
Remove the spark plug.
Measure the spark plug gap.
Spark plug gap: 0.6~0.7 mm
Carefully bend ground electrode of the plug to adjust the gap if necessary.
Screw in the spark plug by hand in order to avoid the damage of the spark plug.
Then tighten it by a spark plug socket wrench.
Tighten torque: 1.0~1.2kgf-m
Install the spark plug cap.



Cylinder Compression Pressure

Warm up the engine.
Turn off the engine.
Remove the luggage box and the central cover.
Remove the spark plug cap and the spark plug.
Install the compression pressure gauge into the spark plug hole.
Full open the throttle valve, and start the engine by the electric starter.



⚠ Caution

- Run the engine until the reading on the gauge stops increasing.
- Usually, the highest pressure reading will be obtained in 4~7 seconds.

Compression pressure：12±2 Kg/cm²

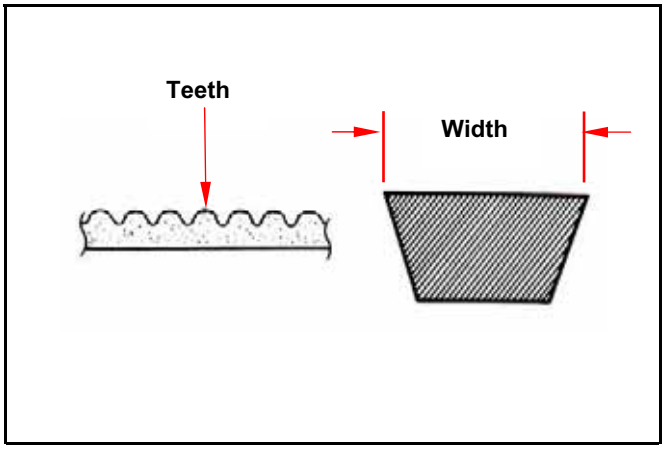
Check following items if the pressure is too low:
- Incorrect valve clearance.
- Valve leaking.
- Cylinder head leaking, piston, piston ring and cylinder worn out.

If the pressure is too high, it means too much carbon deposits in the combustion chamber or on the top of the piston.

CVT system

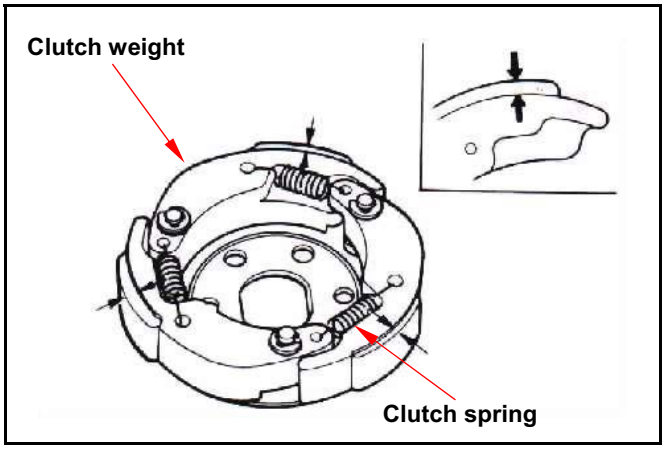
Drive Belt

Remove the engine left side cover.
Check if the belt is cracked or worn out.
Replace the belt if necessary or in accordance with the periodical maintenance chart.
Width limit: 22.5 mm or above



Clutch Weight

Run the motorcycle and increase throttle valve gradually to check the clutch operation.
If the motorcycle vibrates during moving forward, inspect the wear condition of the clutch weight.
Replace it if necessary.



Steering Mechanism

⚠ Caution

- Check all the wires and cables if they are interfered during the rotation of the steering handlebar.

Make the front wheel be spaced from the ground.
Turn the handlebar from right to left and check if it is turned smoothly.
If the handlebar turns unevenly, bent, or can be moved vertically, then adjust the top steering bearing.

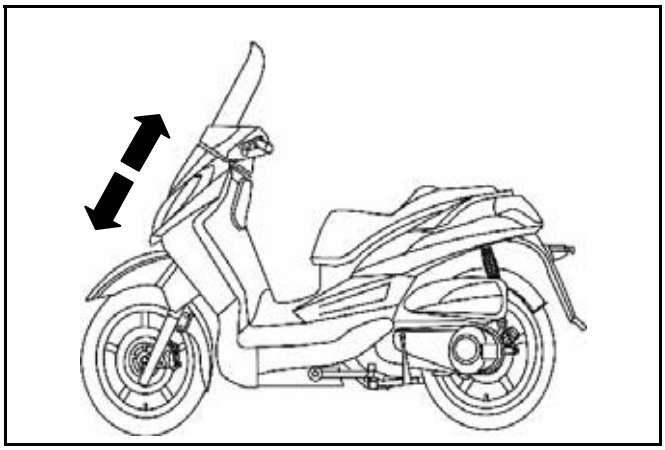
Suspension System

⚠ Caution

- Do not ride the motorcycle with poor cushion.
- Loose, worn or damaged cushion will make poor stability and steering.

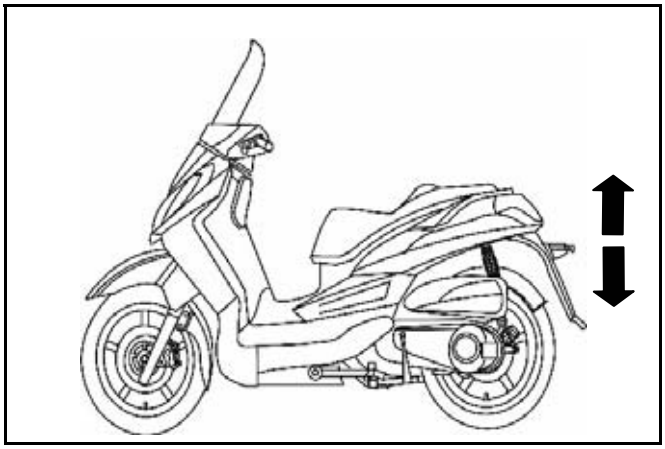
Front suspension

Press the front suspension for several times to check its operational condition.
Replace parts if damage is found.
Tighten all nuts and bolts.



Rear Cushion

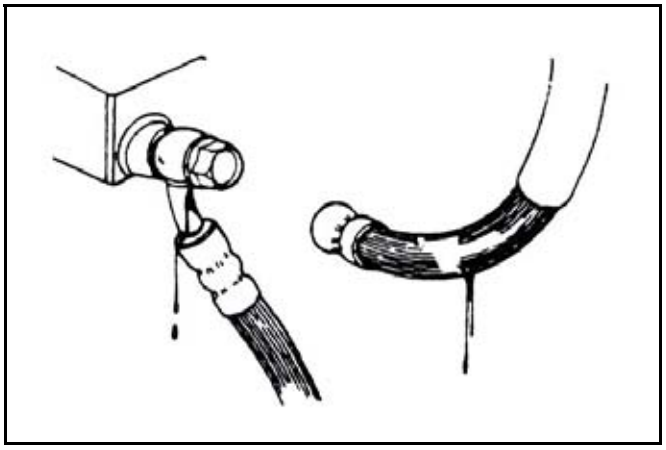
Press the rear cushion for several times to check its operational condition.
Replace parts if damage is found.
Park the motorcycle by main stand and make the rear wheel be spaced from the ground.
Start the engine and speed up gradually.
Replace the rubber bushing if looseness found.
Tighten all nuts and bolts.



Disk Brake System

Brake System Hose

Make sure the brake hoses for corrosion or leaking oil.

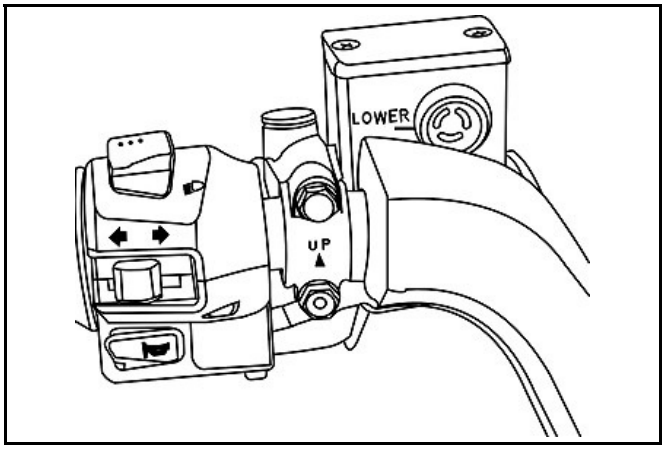


Brake Fluid

Check brake fluid level in the brake fluid reservoir. If the level is lower than the **LOWER** limit, add brake fluid to UPPER limit. Also check brake system for leaking if low brake level found

⚠ Caution

- In order to maintain brake fluid in the reservoir in horizontal position, do not remove the cap until handle stop.
- Do not operate the brake lever after the cap had been removed. Otherwise, the brake fluid will spread out if operated the lever.
- Do not mix non-compatible brake fluid together.



Filling Out Brake Fluid

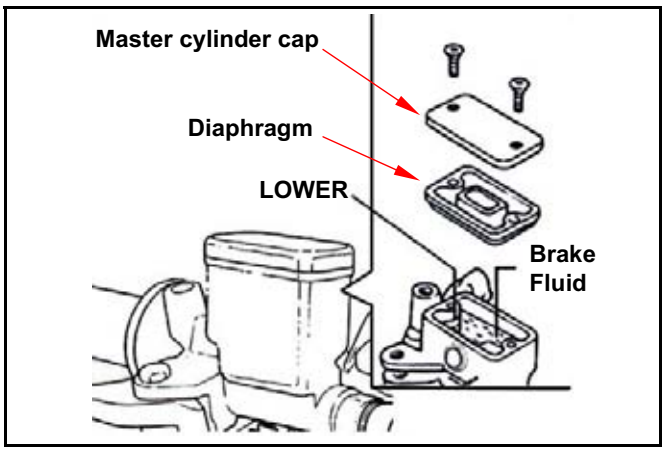
Tighten the drain valve, and add brake fluid. Operate the brake lever so that brake fluid contents inside the brake system hoses.

Added Brake Fluid

Add brake fluid to UPPER limit lever. Recommended brake fluid: DOT3 or DOT4 WELL RUN brake fluid.

⚠ Caution

- Never mix or use dirty brake fluid to prevent from damage brake system or reducing brake performance.

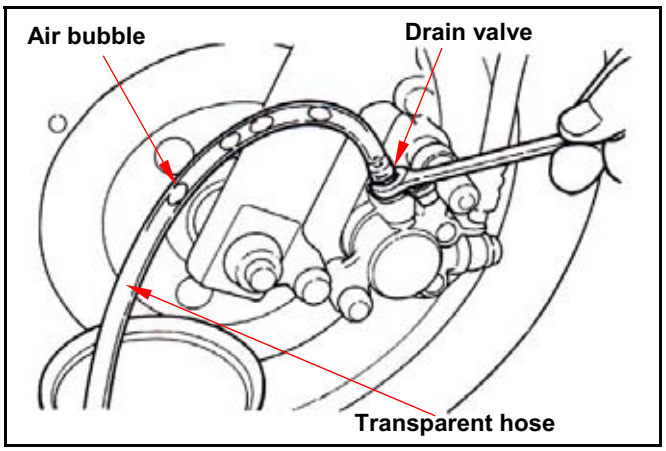


Air Bleed Operation

Connect a transparent hose to draining valve. Hold the brake lever and open air bleeding valve. Perform this operation alternative until there is no air inside the brake system hoses.

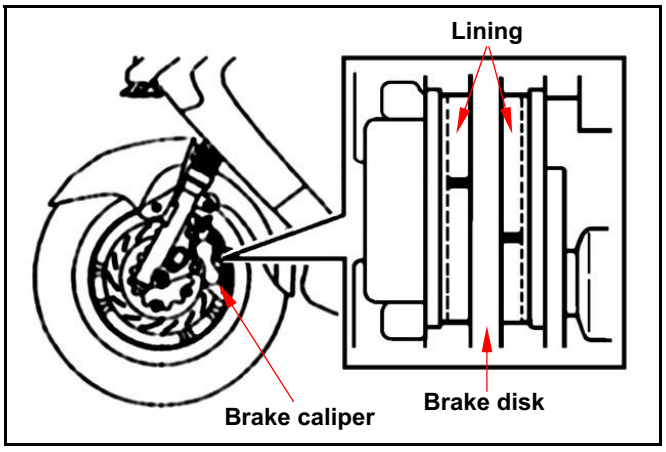
⚠ Caution

- Before closing the air bleed valve, do not release the brake lever.



Brake Lining Wear

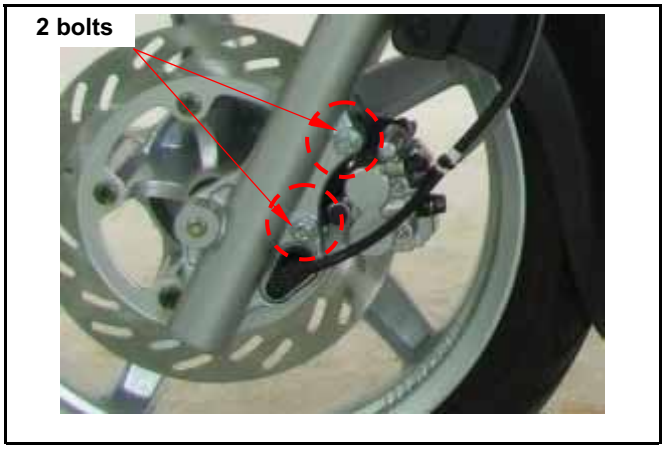
The indent mark on brake lining is the wear limitation.
Replace the brake lining if the wear limit mark closed to the edge of brake disc.



Caution

- It is not necessary to remove brake hose when replacing the brake lining.

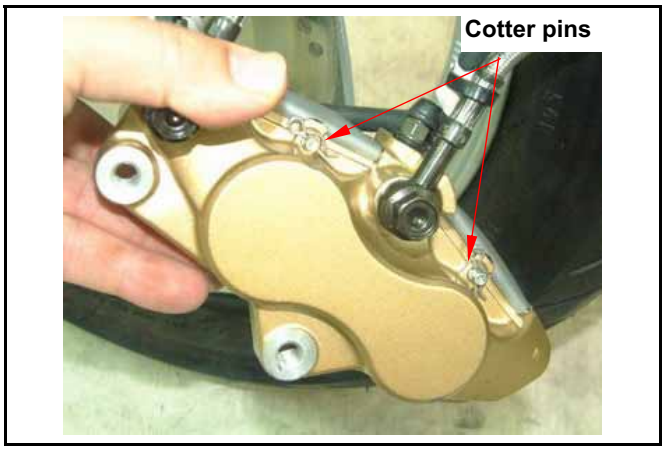
Remove the brake clipper bolt, and take out the clipper.



Caution

- Do not operate the brake lever after the clipper removed to avoid clipping the brake lining.

Pry out the brake lining with a flat driver if lining is clipped.
Remove 2 cotter pins



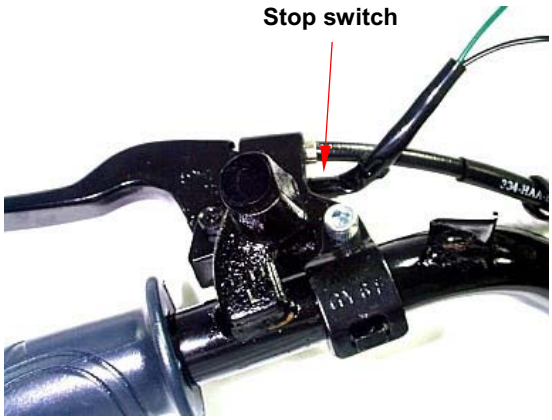
Caution

- In order to maintain brake power balance, the brake lining must be replaced with one set.

Remove the brake pad shafts and pads.

Brake Light Switch/Starting Inhibitor Switch

The brake lamp switch is to light up brake lamp as brake applied.
Make sure that the engine can be started only when brake is applied.

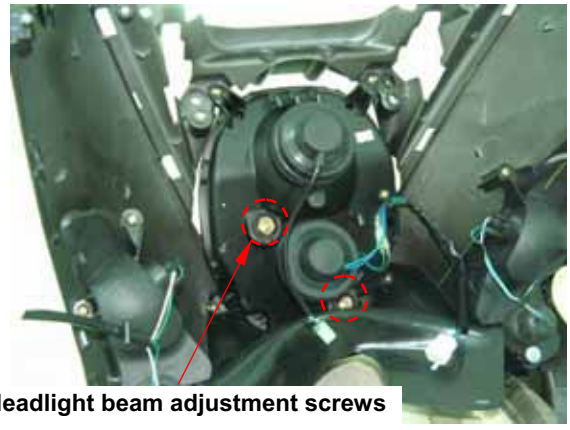


Headlight Beam Distance

Turn on main switch
Headlight beam adjustment. Turn the headlight adjustment screw to adjust headlight beam high.

⚠ Caution

- To adjust the headlight beam follows related regulations.
- Improper headlight beam adjustment will make in coming driver dazzled or insufficient lighting.



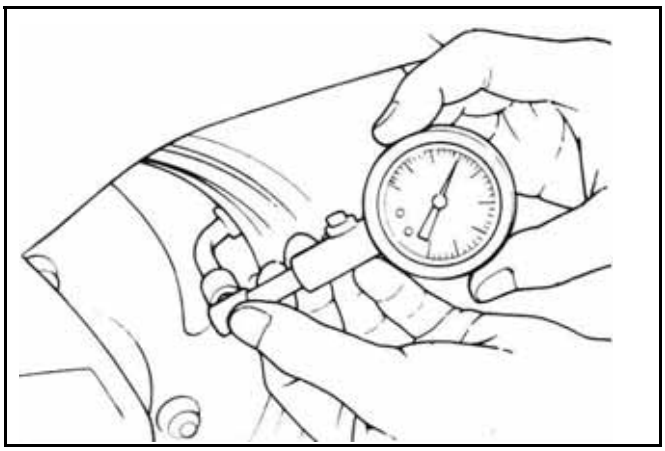
Wheel / Tire

⚠ Caution

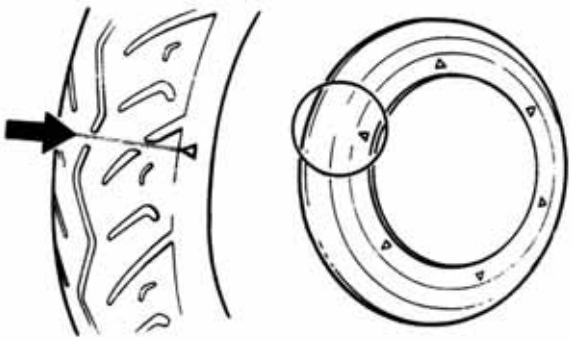
- Tire pressure check should be done as cold engine. ◦

Appointed tire pressure

Tire size		Front tire	Rear tire
Tire pressure as cold engine (Kg/cm²)	Load for under 90 Kg	1.75	2.25
	Full loaded	1.75	2.50

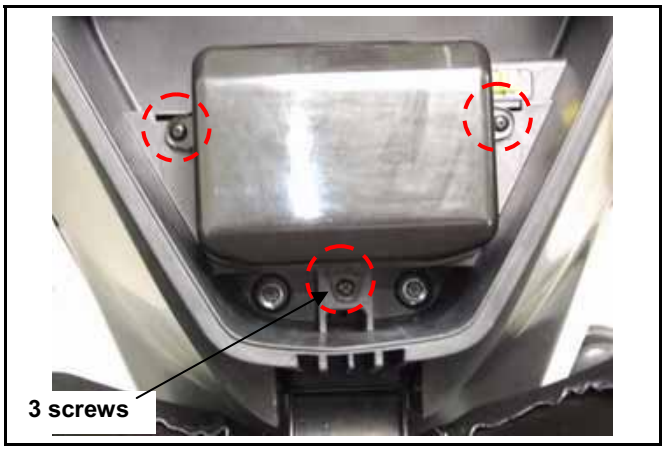


Check if tire surface is ticked with nails, stones or other materials.
Check if front and rear tires' pressure is in normal.
Measure tire thread depth from tire central surface.
Replace the tire if the depth is not come with following specification
Front tire：1.5 mm
Rear tire：2.0 mm



Battery

Open the seat.
Remove 3 screws and remove the battery cover



Battery cable remove：

1. Disconnect the cable negative terminal (-),
2. then the cable positive terminal (+)
3. Remove the battery from the motorcycle. ◦

If there is some rust on battery posts, clean it with steel brush

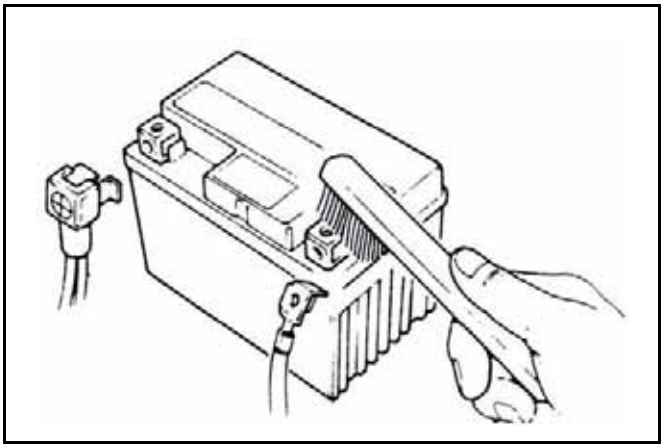
Install the battery in the reverse procedures of removal

⚠ Caution

- If there is rust on the posts very serious, spray some hot water on the posts. Then, clean it with steel brush so that can remove rust for more easily.
- Apply some grease on the posts after rust removed to prevent from rust again.

Nuts, Bolts Tightness

Perform periodical maintenance in accord with the Periodical Maintenance Schedule.
Check if all bolts and nuts on the frame are tightened securely.
Check all fixing pins, snap rings, hose (pipe) clamps, and wire holders for security.



Special Tools List

NAME	Left crank bearing puller	NAME	R/L. crank case disassemble tool	NAME	Valve cotter remove & assembly tool
NO	SYM-9100100	NO	SYM-1120000-HMA H9A	NO	SYM-1471110/20
NAME	L. Crank shaft puller	NAME	Clutch special nut socket	NAME	Tappet adjusting
NO	SYM-1130000-HMA H9A	NO	SYM-9020210-HMA	NO	SYM-1472100
NAME	R. crank case bearing 6201 assembles tool	NAME	Left crankshaft & oil seal assembly socket.	NAME	Rocker arm shaft disassemble
NO	SYM-9614000-HMA 6201	NO	SYM-1332100-HMA RB1	NO	SYM-1445100
NAME	Bearing driver set	NAME	Assembly directs puller	NAME	Drive shaft puller
NO	SYM-6204024	NO	SYM-2341110	NO	SYM-2341120- HMA RB1

NAME	Inner bearing puller	NAME	Outer bearing puller	NAME	Handle stand nut wrench
NO	SYM-6204025	NO	SYM-6204010	NO	SYM-5321100
NAME	Clutch nut wrench	NAME	Universal holder	NAME	AC.G. Flywheel puller
NO	SYM-9020200	NO	SYM-2210100	NO	SYM-3110000-HMA
NAME	Steering head top thread wrench	NAME	Bearing driver HK1516	NAME	Bearing puller 6205
NO	SYM-5320010	NO	SYM-9100200-HMA RB1 HK1516	NO	SYM-9100400 HMA RAI 6205
NAME	Air operated bearing puller	NAME	Oil seal driver 34*52*5	NAME	Right crankcase cover bearing 6201 puller.
NO	SYM-9100410-400 A6205	NO	SYM-9125500-HMA	NO	SYM-9614000-HMA RB1 6201

NAME	Clutchspring compressor	NAME	Drive shaft & oil seal (25*40*8) socket	NAME	Bearing puller 6303
NO	SYM-2301000-HMA	NO	SYM-9120200-HMA RB1	NO	SYM-6303000- A 6303
		(Ø30mm)		(Ø22mm)	
NAME	Bearing driver 6201	NAME	Crankcase bush puller	NAME	Crankcase bush puller
NO	SYM-9614000-6201	NO	SYM-1120310	NO	SYM-1120320
NAME	Water pump mechanical seal driver	NAME	Water pump bearing driver 6901	NAME	Water pump oil seal driver (inner)
NO	SYM-1721700-H9A	NO	SYM-9100100	NO	SYM-9120500-H9A

Note:

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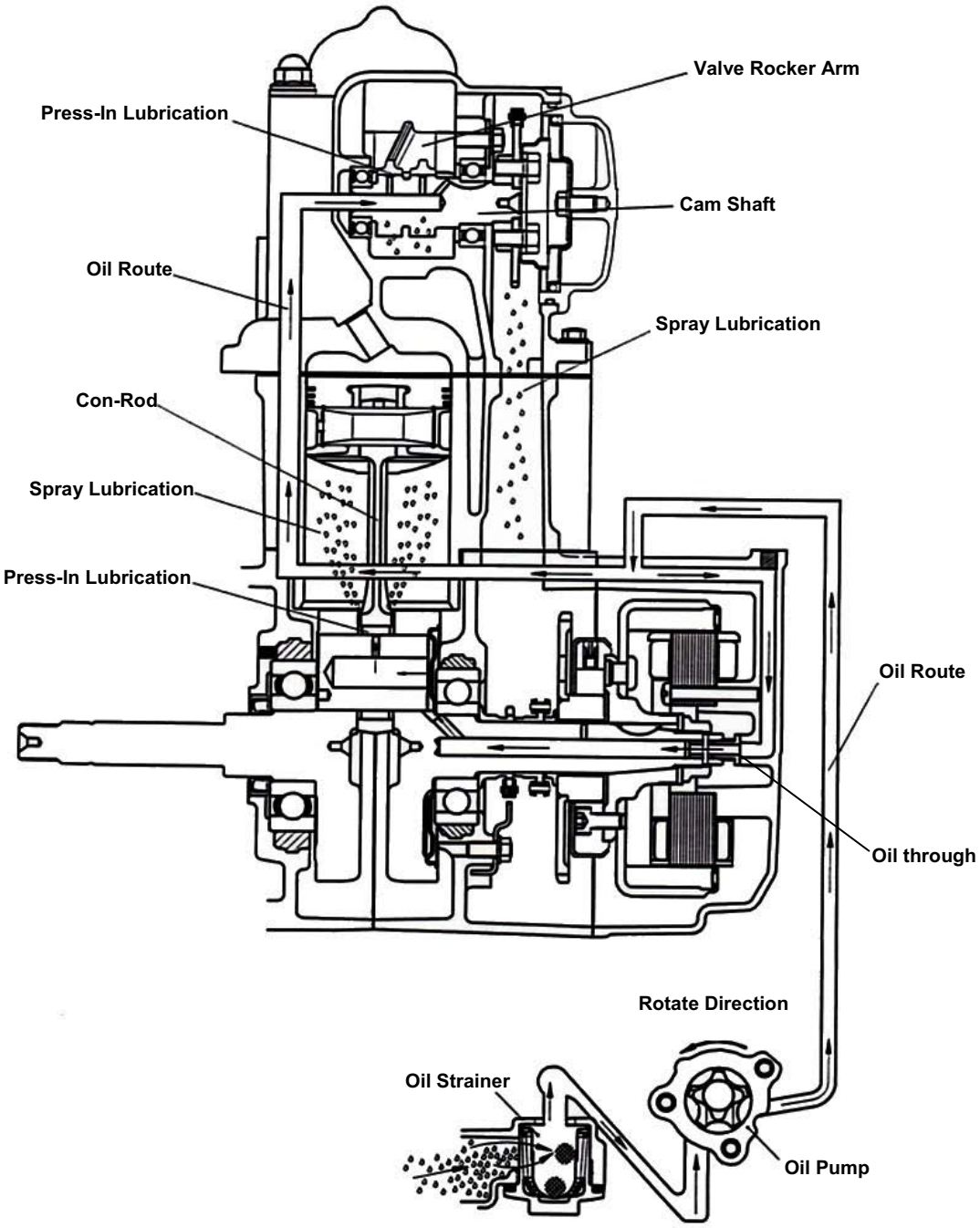
Troubleshooting ····· 3-2	Oil Pump ····· 3-4
Engine Oil ····· 3-3	Gear Oil ····· 3-7



Precautions in Operation

General Information:

- This chapter contains maintenance operation for the engine oil pump and gear oil replacement.

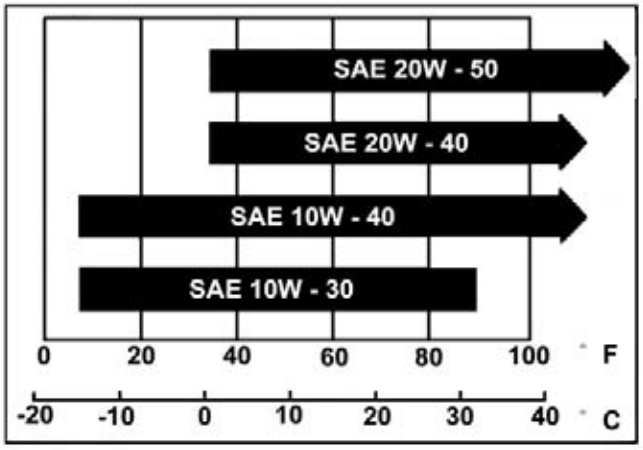
Specifications

Engine oil quantity Disassembly: 1400 c.c.
Change: 1200 c.c.

Oil viscosity SAE 10W-30 (Recommended King serial oils)

Gear oil Disassembly: 180 c.c.
Change: 160 c.c.

Gear oil viscosity SAE 140
(Recommended SYM Hypoid gear oils)



Items		Standard (mm)	Limit (mm)
Oil pump	Inner rotor clearance	0.15	0.20
	Clearance between outer rotor and body	0.15~0.20	0.25
	Clearance between rotor side and body	0.04~0.09	0.12

Torque value

Torque value oil strainer cap	1.5~3.0kgf-m
Gear oil drain plug	1.0~1.5kgf-m
Gear oil inspection bolt	1.0~1.5kgf-m
Oil pump connection bolt	0.8~1.2kgf-m

Troubleshooting

Low engine oil level

- Oil leaking
- Valve guide or seat worn out
- Piston ring worn out

Low oil pressure

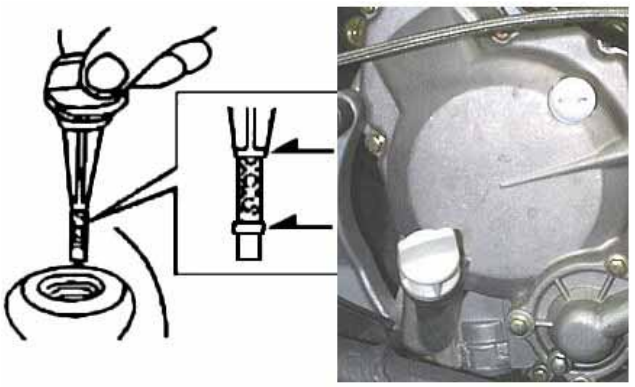
- Low engine oil level
- Clogged in oil strainer, circuits or pipes
- Oil pump damage

Dirty oil

- No oil change in periodical
- Cylinder head gasket damage
- Piston ring worn out

Engine Oil

Turn off engine, and park the motorcycle in flat surface with main stand.
Check oil level with oil dipstick
So not screw the dipstick into engine as checking.
If oil level is nearly low level, fill out recommended oil to upper level.

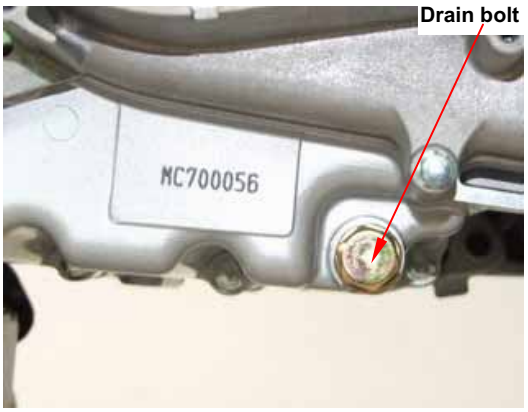


Oil Change

⚠ Caution

Drain oil as engine warmed up so that make sure oil can be drained smoothly and completely.

Place a oil pan under the motorcycle, and remove oil drain bolt.
After drained, make sure washer can be re-used.
Install oil drain bolt.
Torque value：1.9~2.5kgf-m

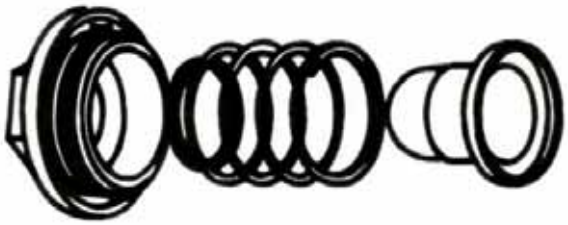


Engine Oil Strainer Clean

Drain engine oil out.
Remove oil strainer and spring.
Clean oil strainer.
Check if O-ring can be re-used.
Install oil strainer and spring.
Install oil strainer cap.
Torque value：1.9~2.5kgf-m
Add oil to crankcase (oil viscosity SAE 10W-30)
Recommended using King serial oil.

Engine oil capacity: 1.2 L when replacing

Install dipstick, start the engine for running several minutes.
Turn off engine, and check oil level again.
Check if engine oil leaks.

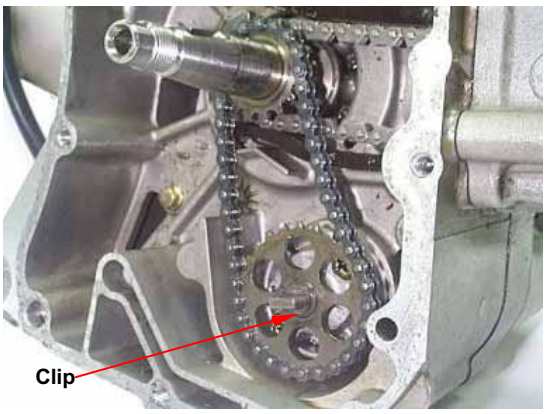


Oil Pump

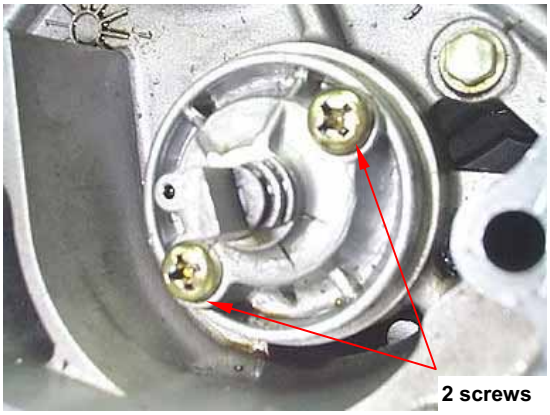
Oil Pump Removal

Remove generator and starting gear. (Refer to chapter 10) ◦

Remove snap ring and take out oil pump driving chain and sprocket.



Make sure that pump shaft can be rotated freely. Remove 2 bolts on the oil pump, and then remove oil pump.



Oil Pump Disassembly

Remove the screws on oil pump cover and disassemble the pump as illustration shown.

Oil Pump Inspection

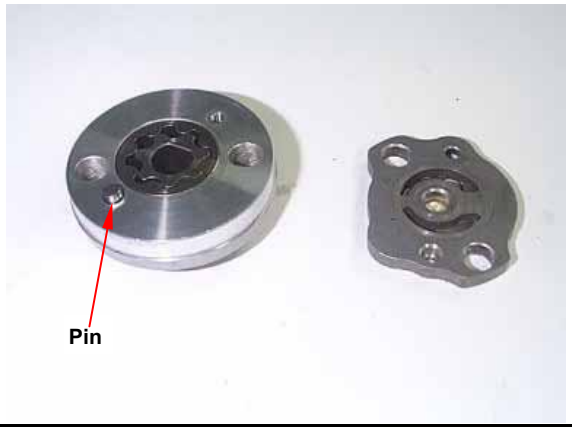
Check the clearance between oil pump body and outer rotor.

Limit: 0.25 mm

Check clearance between inner and outer rotors.
Limit: 0.20 mm

Check clearance between rotor side face and pump body
Limit: 0.12 mm

Oil Pump Re-assembly
Install inner and outer rotors into the pump body
Align the indent on driving shaft with that of inner rotor. Install the driving shaft
Install fixing pin



Install the oil pump cover and fixing pin properly

Oil Pump Installation

Install the oil pump, and then tighten bolts.
Torque value : 0.8~1.2kgf-m

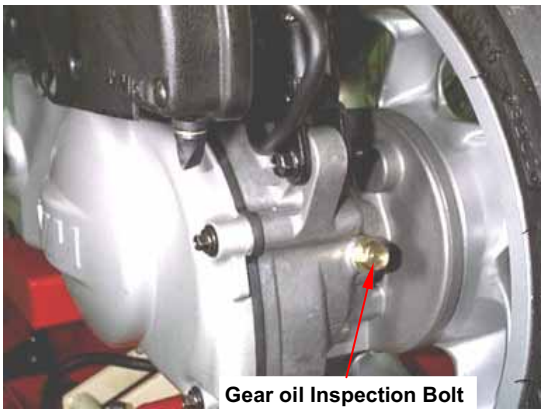
Make sure that oil pump shaft can be rotated freely.

Install oil pump driving chain and sprocket, and then install snap ring onto oil pump shaft.

Install starting gear and generator.
(Refer to chapter 10)

Gear Oil

Oil level inspection
Park the motorcycle on flat surface with main stand.
Turn off engine and remove oil inspection bolt.


Gear oil Inspection Bolt

Gear lubrication oil quantity has to be measured with measure device.
If oil level is too low, add gear oil. Recommended using King series oils.
Install oil inspection bolt.

Gear oil drain plug

Gear Oil Change

Remove oil level inspection bolt.
Remove drain plug and drain oil out.
Install the drain plug after drained.
Torque value: 1.0~1.4kgf-m
Make sure that the drain plug washer can be re-used.
Add oil to specified quantity from the inspection hole.
Gear Oil Quantity: 160 c.c. when replacing
Make sure that the bolt washer can be re-used, and install the bolt.
Start engine and run engine for 2-3 minutes.
Turn off engine and make sure that oil level is in correct level.
Make sure that no oil leaking.

Notes:

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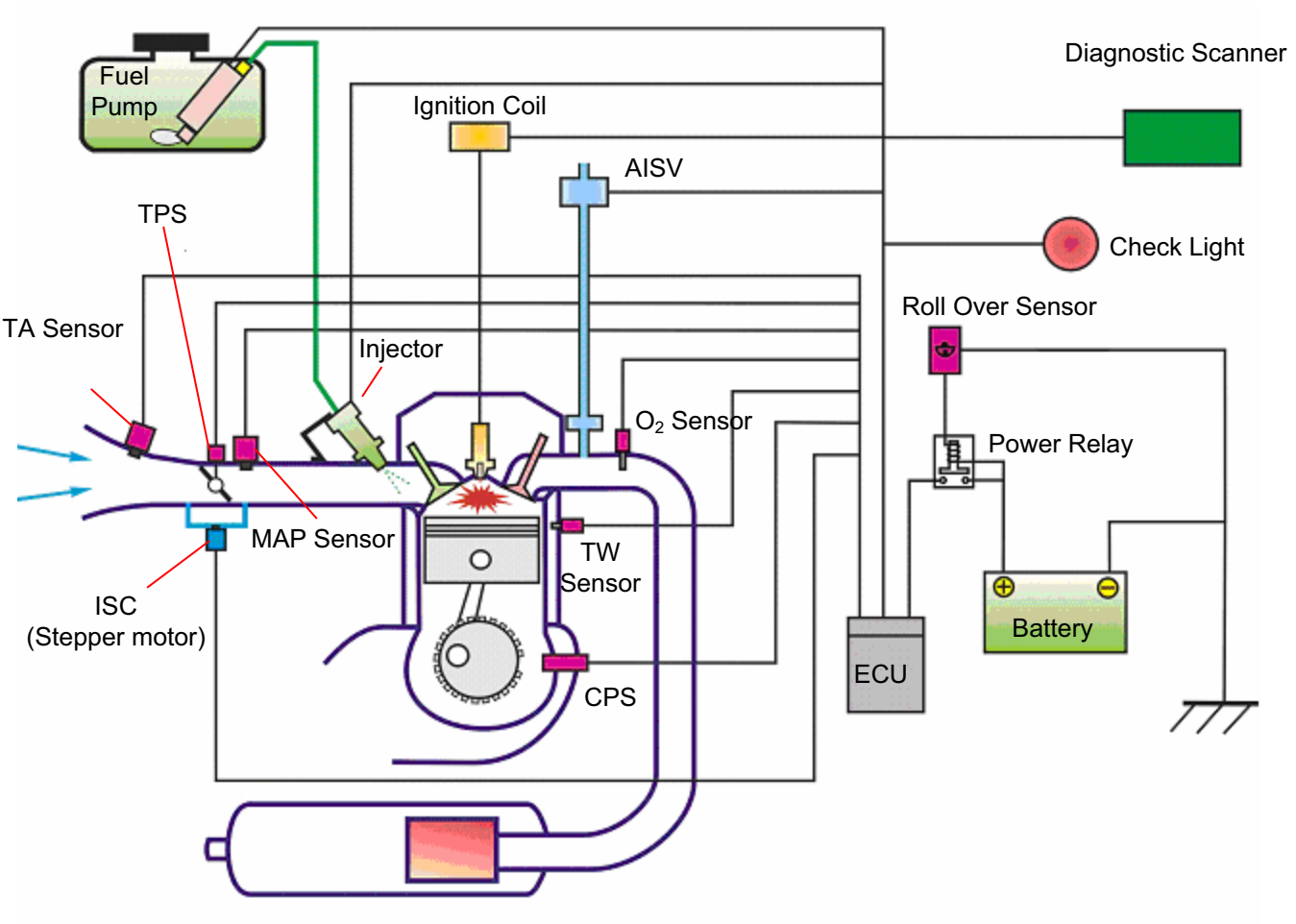
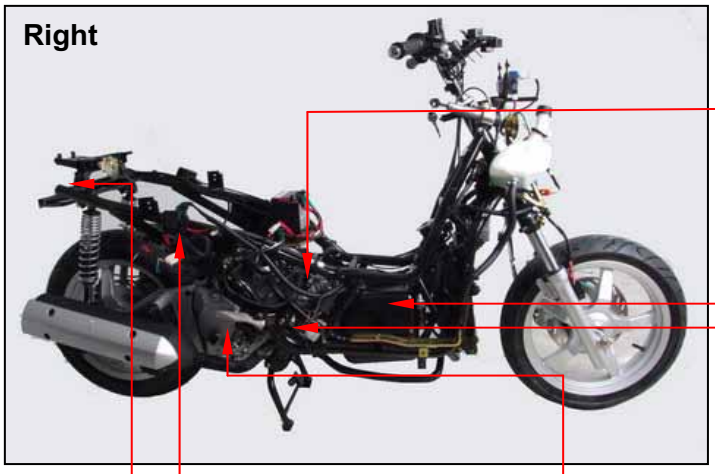
Fuel Injection System Components



Fuel Injection System Configuration



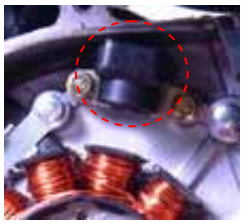
MAP Sensor, ISC, Fuel Injector

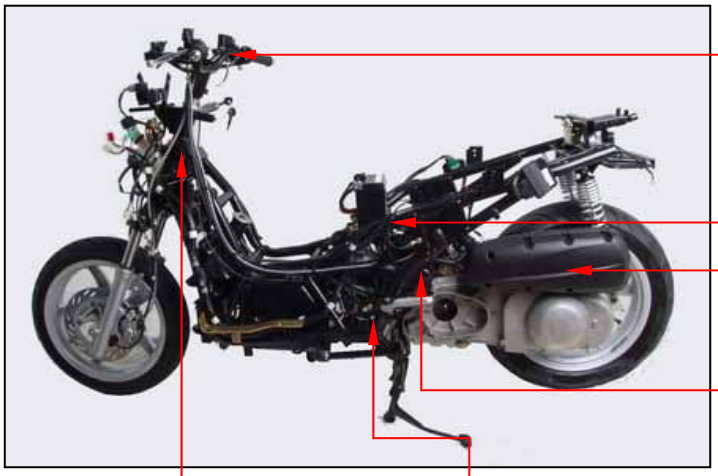
Fuel Pump

O_2 Sensor

Roll Over Sensor

ECU


CPS



EFI Check Light

TW Sensor

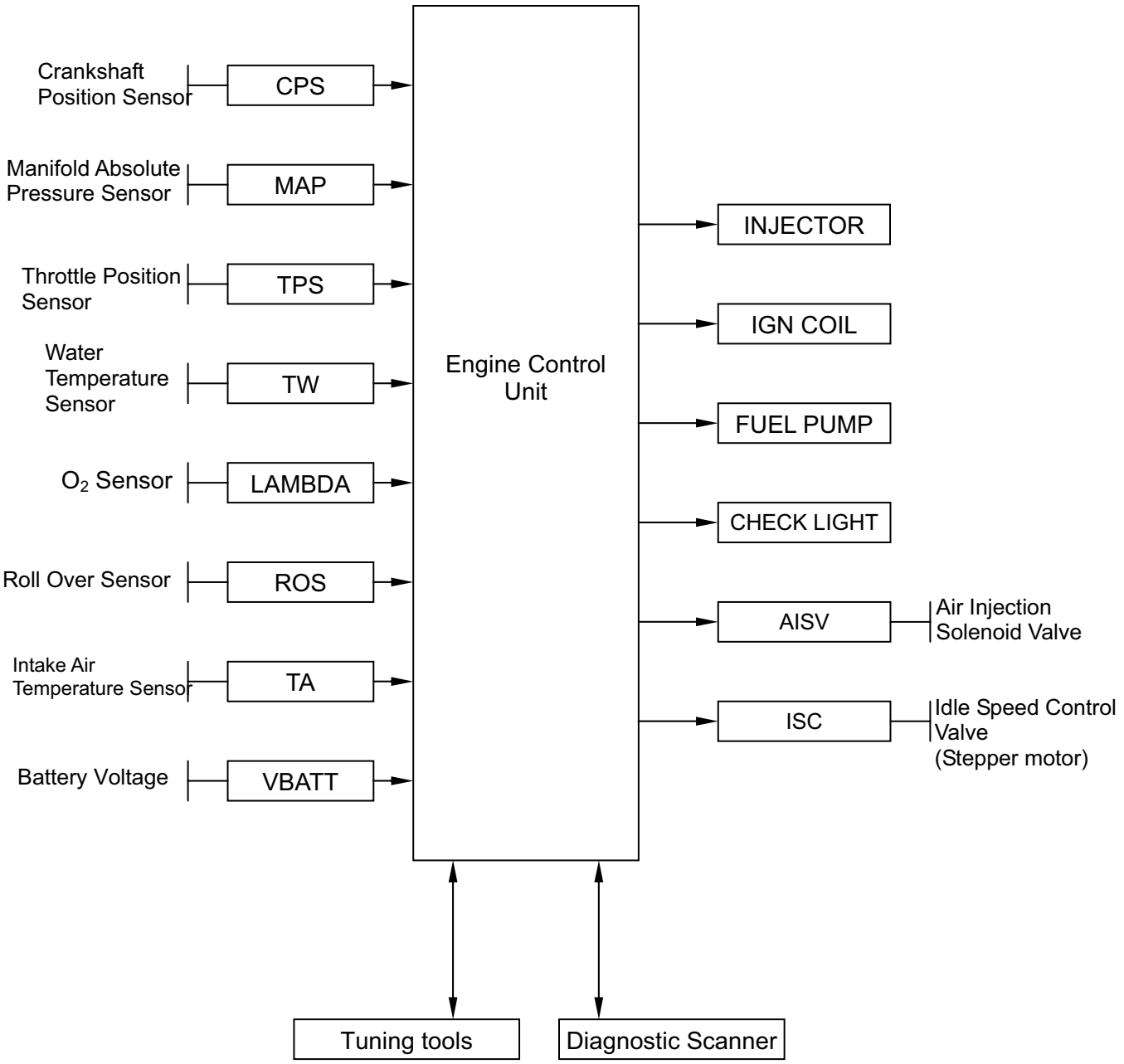
Diagnostic Coupler

AISV

TPS

TA Sensor

Operation of Fuel Injection System



4. Fuel Injection System

Fuel Injection System Introduction

Based on 4-stroke SOHC engine, displacement 250 c.c. electronically controlled fuel injection system, evaporative fuel absorbed by the activated carbon canister. The engine burns off the blow-by fuel-gas from the crankcase through the fuel-air separating device. The O_2 Sensor enhances the efficiency of the catalytic converter, by dynamically controlling the Air/Fuel ratio.

Electronic Fuel Injection Devices

Fuel supplying devices: fuel tank, fuel pump, fuel filter, and fuel pressure regulator.
Fuel controlling devices: fuel injector, and ECU.
The fuel is pumped by the electrical fuel pump inside the fuel tank to the injector fixed on the intake manifold. The fuel pressure regulator keeps the fuel pressure around 294±6kpr. The signals from ECU enable the injector to spray fuel into the combustion chamber once each two crankshaft-revolutions. The excessive fuel flows back to the fuel tank through the pressure regulator. Fuel pump is placed inside the fuel tank to reduce the working noise. Electrically controlled ignition and injection system effectively reduce fuel consumption rate and air pollution.

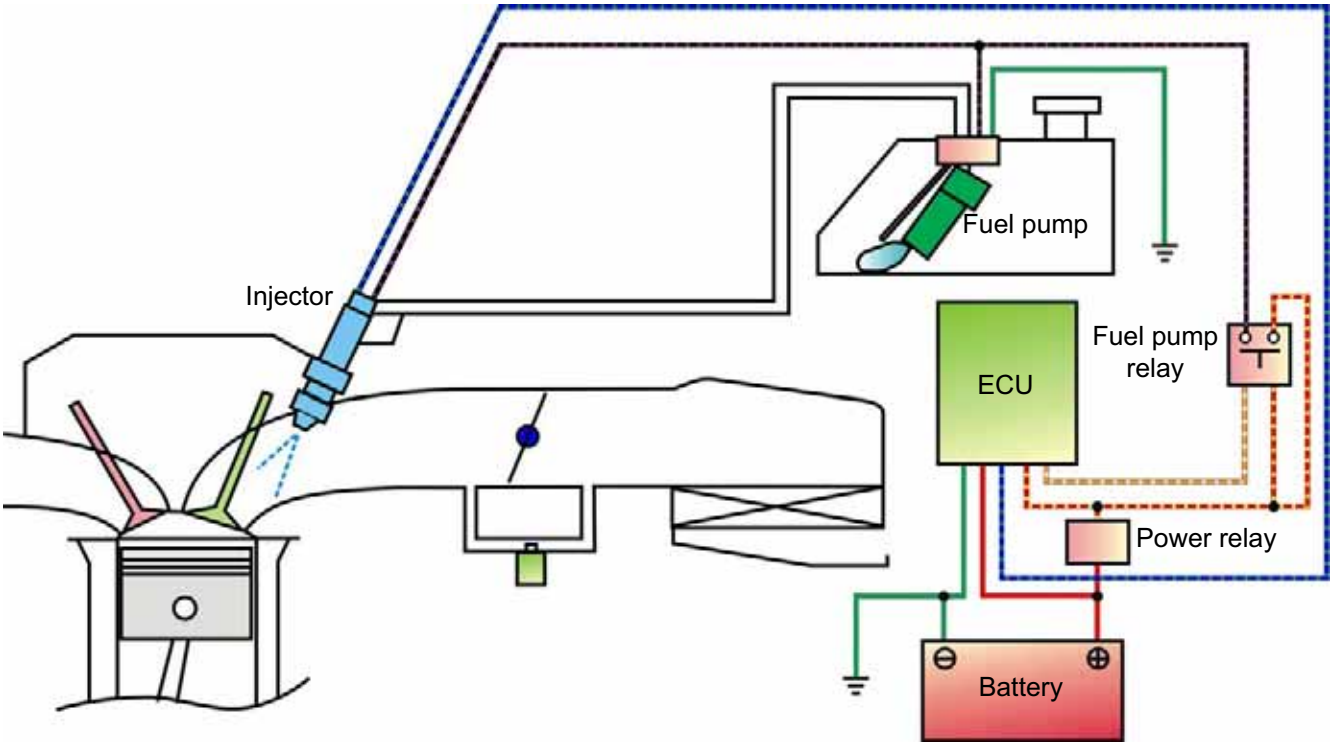
In traditional gasoline engine, carburetor supplies the fuel. The process is done by engine vacuum, and the negative pressure in the carburetor mixes fuel with air. Under this condition, three major processes are done simultaneously in the carburetor: 1. Air quantity measurement. 2. The determination of fuel quantity. 3. Mixing of fuel and air.

Electronic Fuel Injection System separates the three major processes into three different devices: 1. MAP Sensor and TA Sensor gauge the air quantity and temperature and send the signal to ECU as a reference. 2. ECU decides the amount of fuel to be injected, according to the default Air/Fuel ratio. 3. ECU enables the injector to spray appropriate fuel amount. The independence of these three functions will raise the accuracy of the whole process.

EFI engine uses computer-programmed fuel injection, the main features are:

1. The quantity of fuel injected is decided according to the condition of the engine. The engine RPM, and the throttle position determine the fuel quantity and injection time length. This throttle-controlled fuel injection is better responding and more accurate.
2. The quantity of fuel injection, and the determination of injection time length, are all controlled by 16-bit microcomputer.
3. The fuel pressure regulator maintains a 294±6kpr pressure difference between intake manifold and fuel pipe, raising the accuracy of fuel injection.
4. By measuring the air pressure of intake manifold, this system gives the vehicle better accommodation to the environment.
5. Idle speed control system supplies fuel and air to stabilize the idle running, and cold starting.
6. O_2 Sensor feeds back the signal to minimize the exhaust pollution.

Fuel System Outline



System Description

1. After Key-on, the sensors send signals to the ECU. ECU controls the fuel pump relay, making the fuel pump operate. If the engine is not started, the fuel pump will be shut down in 2 or 3 seconds in order to save electricity. The fuel pressure regulator maintains fuel pressure at 294 ± 6kpa (about 3 kg / cm ²). According to the operating conditions and the environmental compensation coefficients, fuel injector injects appropriate fuel quantity. Key-off or engine stopped operating, the fuel pump stops running.
2. Impurities are filtrated by the fuel filter, which should be regularly replaced.
3. When the engine can not be started, do not start motor for continuous movement which could led to lack of battery electricity (less than 10 V), the electric fuel pump will not be able to move.

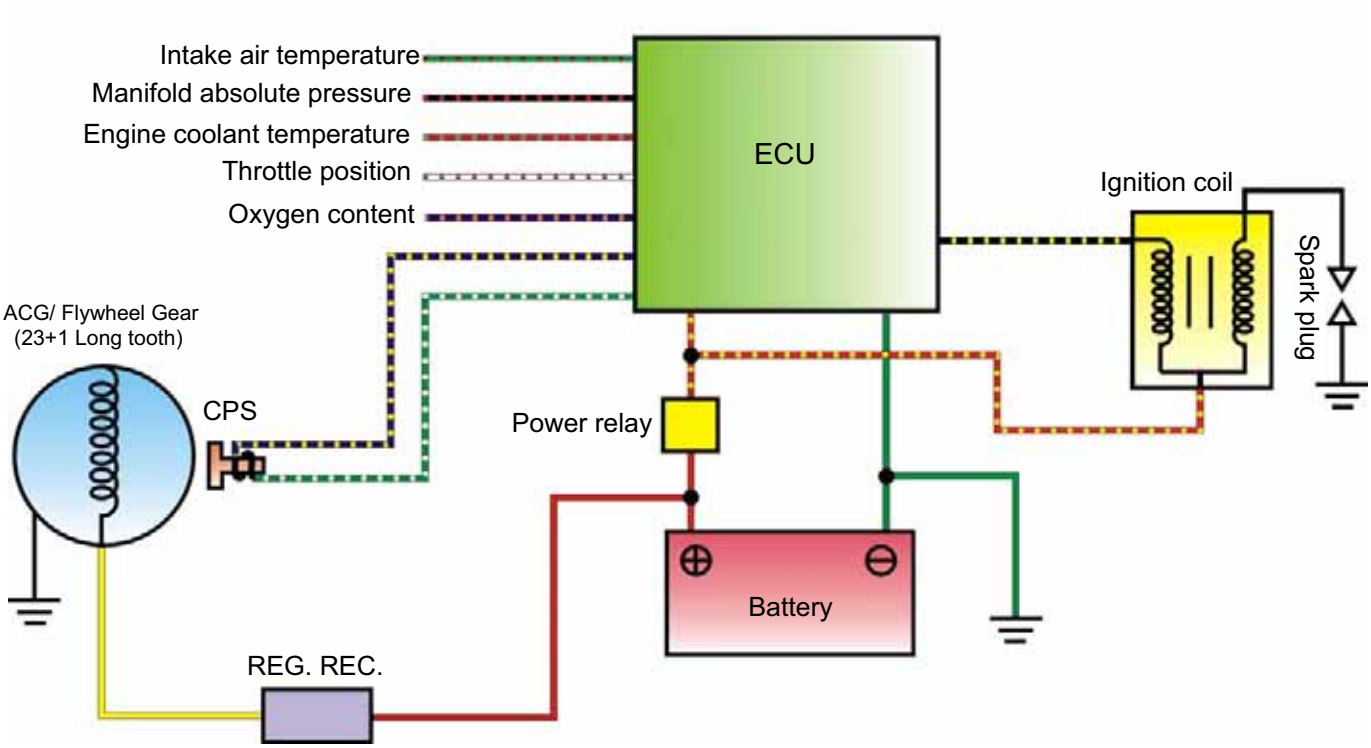
Injector

Two-hole injector provides intake valves with two fuel injection, increasing fuel atomization effect, and reducing HC emission. The short-type injector cap can easily fix the injector and receives fuel from the fuel pump, preventing the injector from rotating and sliding. ECU supplies control signals to the fuel pressure regulator which uses the diaphragm and spring to maintain the fuel pressure at 294 ± 6kpa (about 3 kg / cm ²), and controls the injection quantity by determining the injection time width.

Fuel pump

Electrical fuel pump is mounted inside the fuel tank, powered by the battery and controlled by ECU. Fuel pressure at idle speed: 294 ± 6kpa (about 3 kg / cm ²).

Ignition System Outline



Principle

ECU determines the appropriate ignition timing by receiving the signals from the CPS, TPS, O_2 Sensor, MAP Sensor, TA Sensor and TW Sensor in accordance with the engine RPM. The ignition coil produces 25000~30000 volts to fire the spark plug, maximizing the engine output, and improving the fuel comsumption efficiency.

Specifications

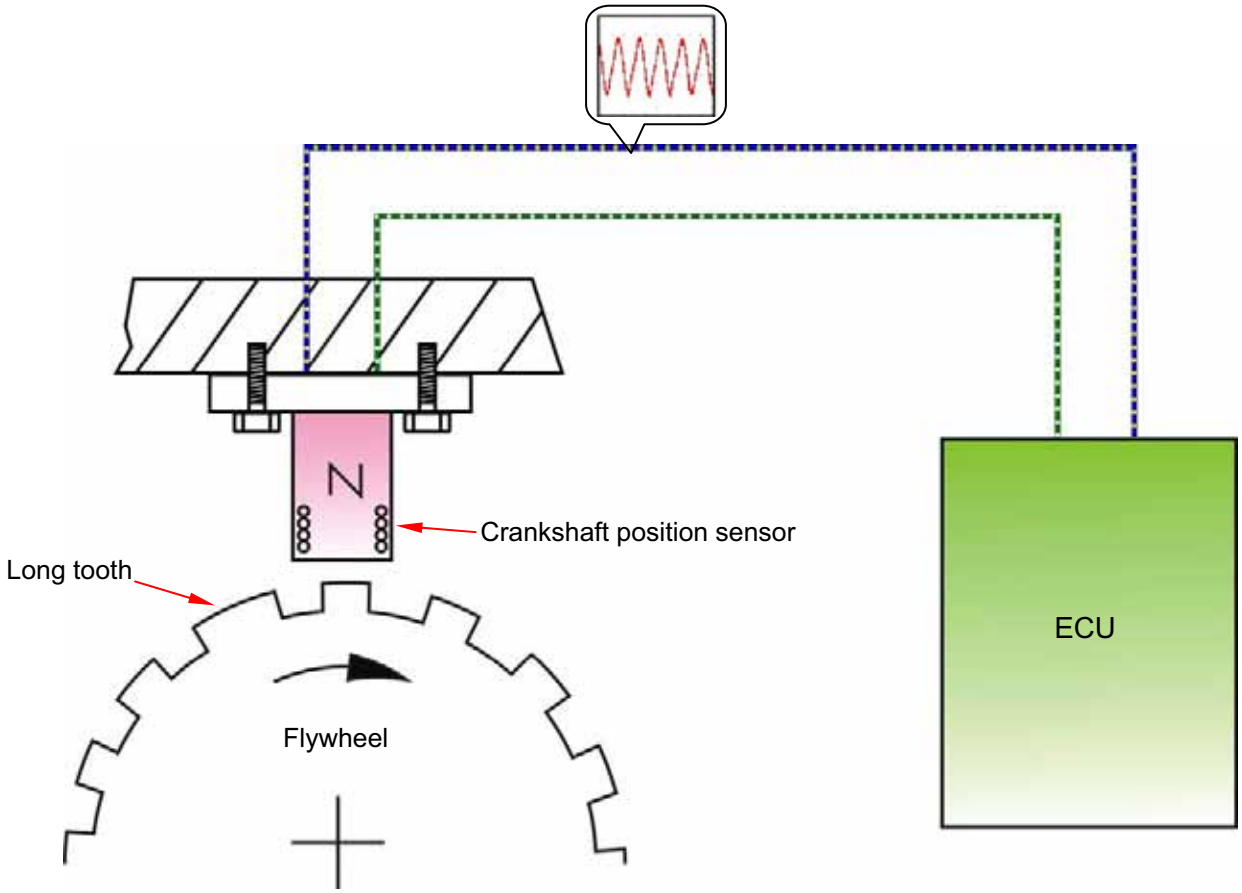
1. Ignition timing: 13 ° BTDC / 1650RPM
2. Spark plug: NGK CR8E Clearance: 0.6 to 0.7 mm
3. Crankshaft Position Sensor electric resistance: 80 ~ 160 Ω (Green / White - Blue / Yellow)
4. Ignition coil primary circuit: 2.8 Ω ± 15% (20 ° C) (Red / Yellow - Black / Yellow)
5. Battery Type: YTX12A-BS or GTX12A-BS Capacity: 12V 12Ah

Sensors and Drives Outline

Crankshaft Position Sensor (CPS)

Function:

CPS inducts the teeth sequence on the flywheel and transmits voltage signals to ECU to make it work properly.



Note:

When starting, the TDC position is not known yet; CPS detects the long tooth on the flywheel, determining the TDC position, with the ignition timing being fixed. When the engine RPM reaches the software pre-set RPM, the ignition timing will switch to the software settings.

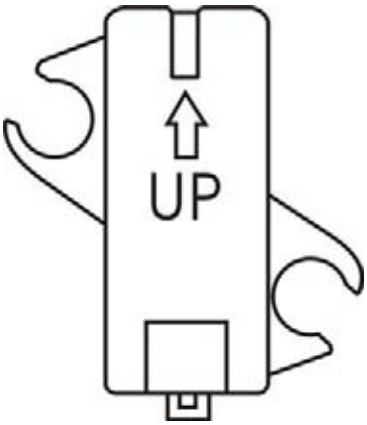
Roll Over Sensor (ROS)

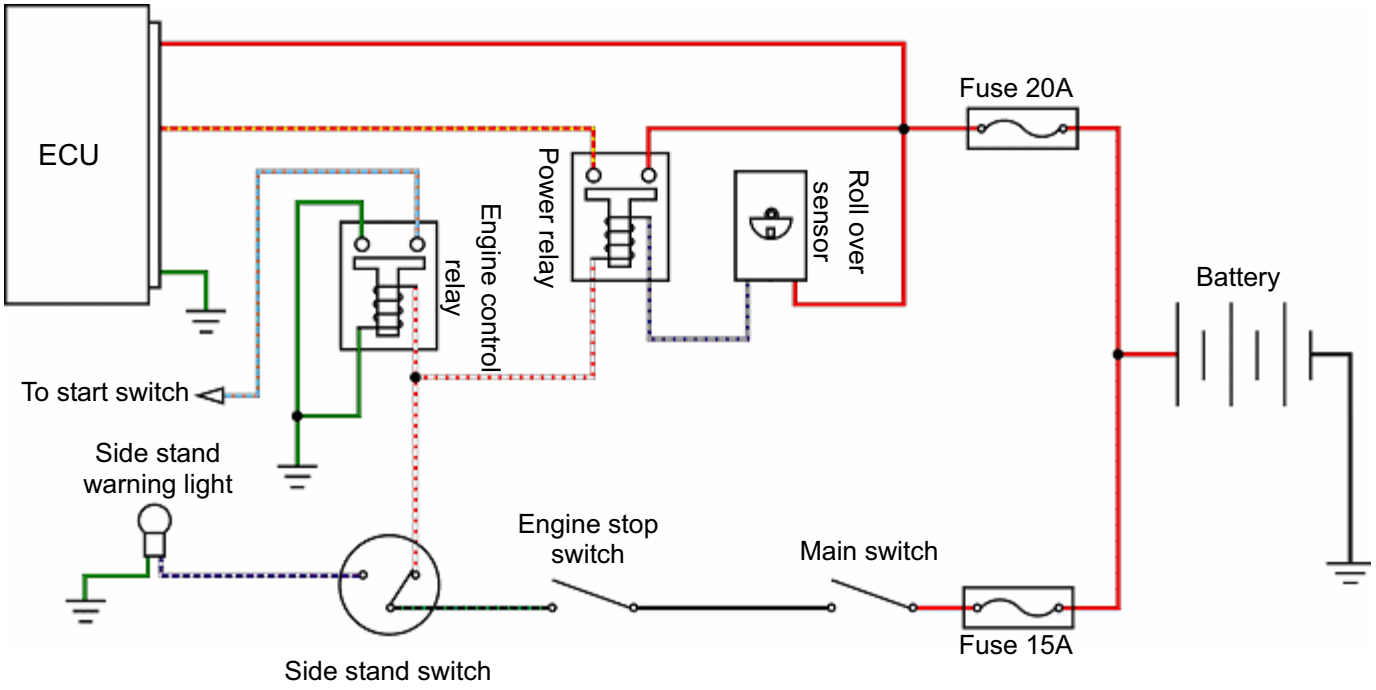
Function:

As a safety device, when the motocycle is overturned, ROS cuts off the power supply of ECU and shut down the engine.

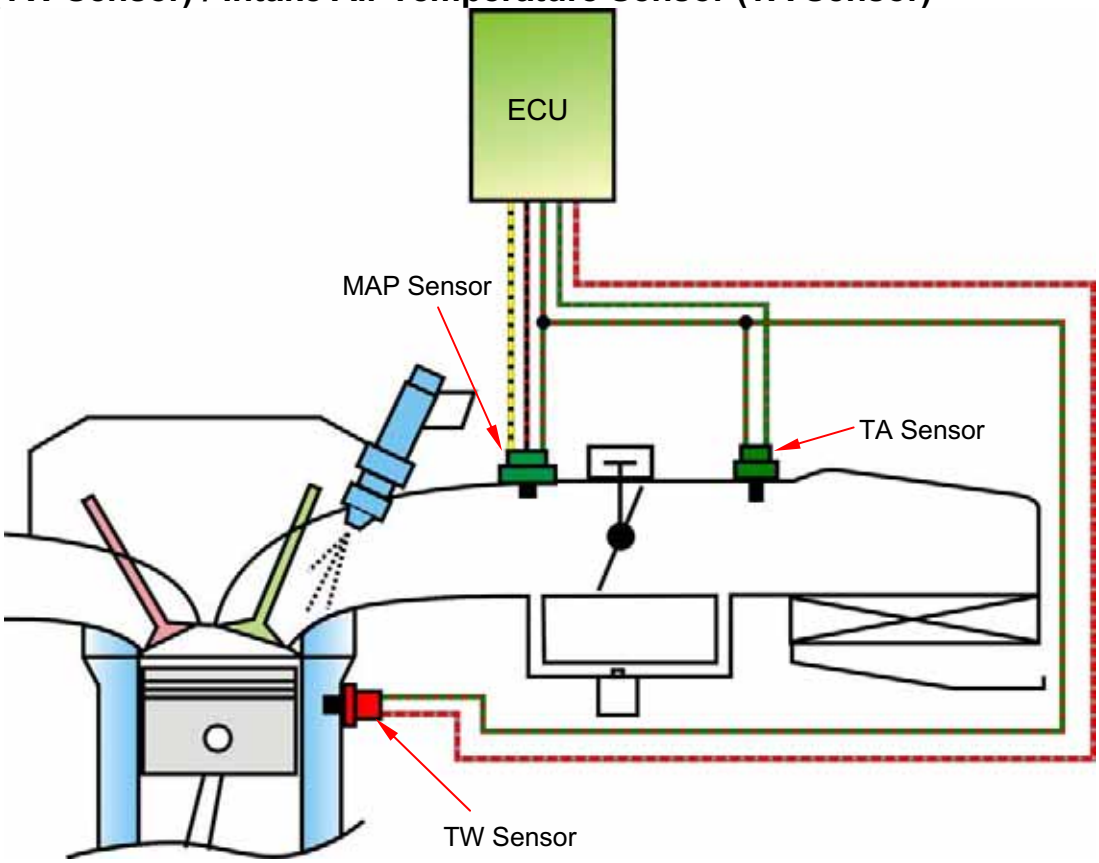
Note:

When the motorcycle is leaning more than 65 degrees, the power of ECU will be shut off. To restart the engine, you need to Key-on the main switch again.



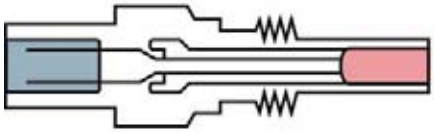


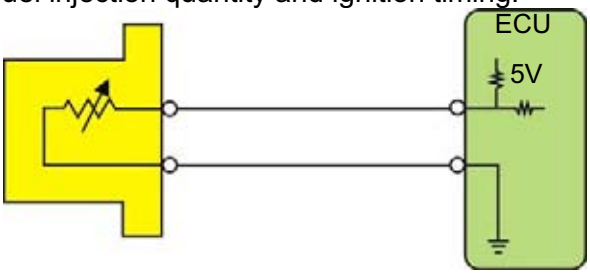
Manifold Absolute Pressure Sensor (MAP Sensor) / Engine Coolant Temperature Sensor (TW Sensor) / Intake Air Temperature Sensor (TA Sensor)



TW Sensor / TA Sensor:

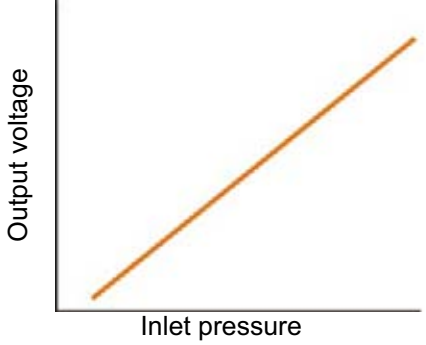
Using negative temperature coefficient thermistor, TW Sensor and TA Sensor measure outside temperature. As heat goes up, resistance goes down; resistance goes up as temperature goes down, providing ECU temperature signals to determine the fuel injection quantity and ignition timing.

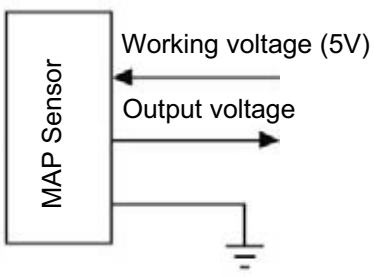




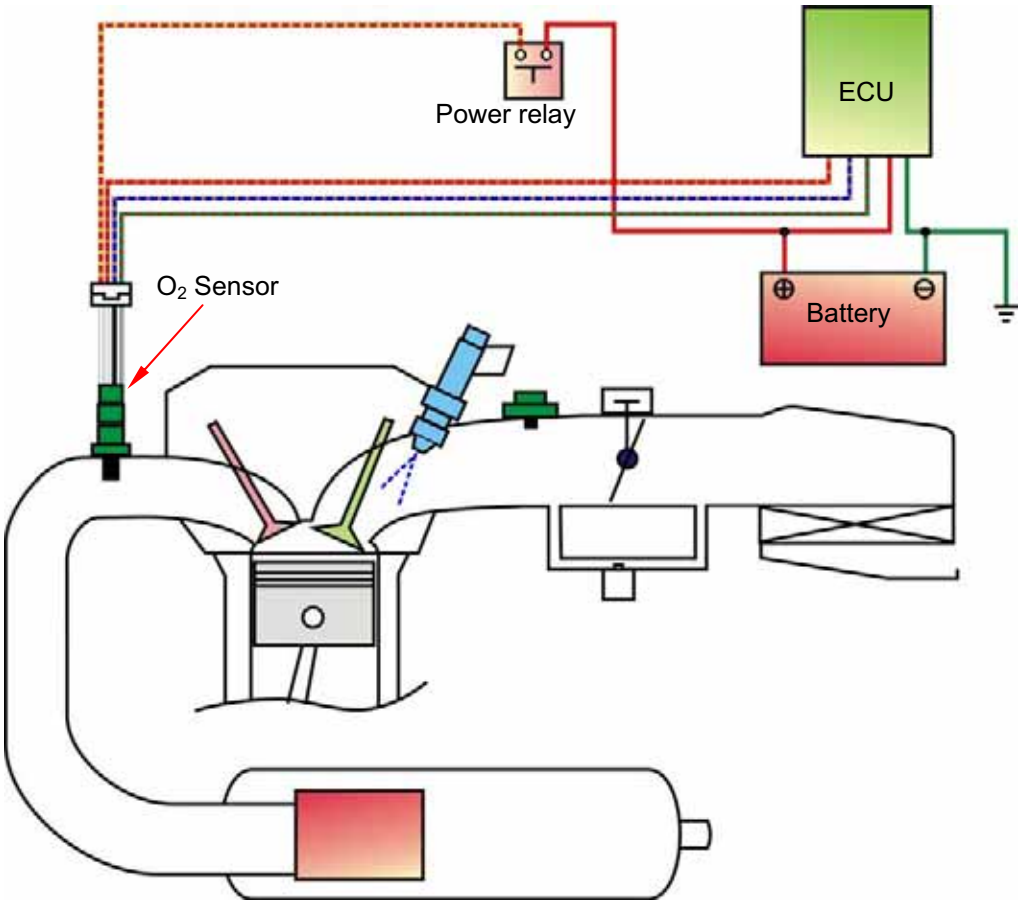
MAP Sensor:

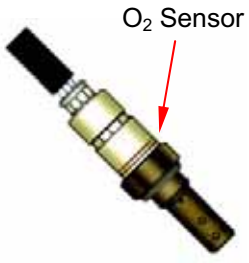
MAP Sensor uses the piezoresistive resistor composed of silicon diaphragm, forming the Wheatstone bridge circuit to measure the atmospheric pressure and the intake manifold pressure, which are both transmitted to ECU for reference of engine control.

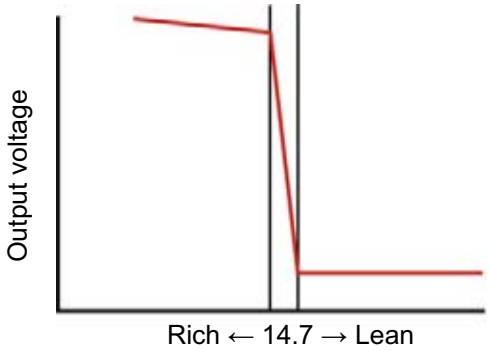


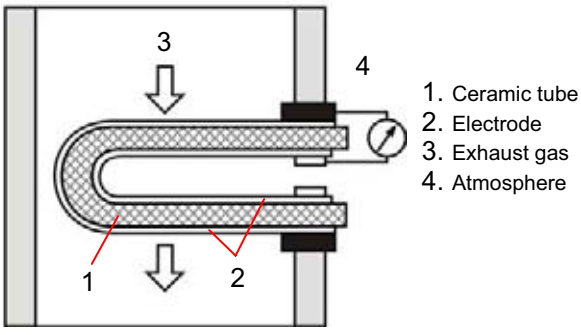


O_2 Sensor







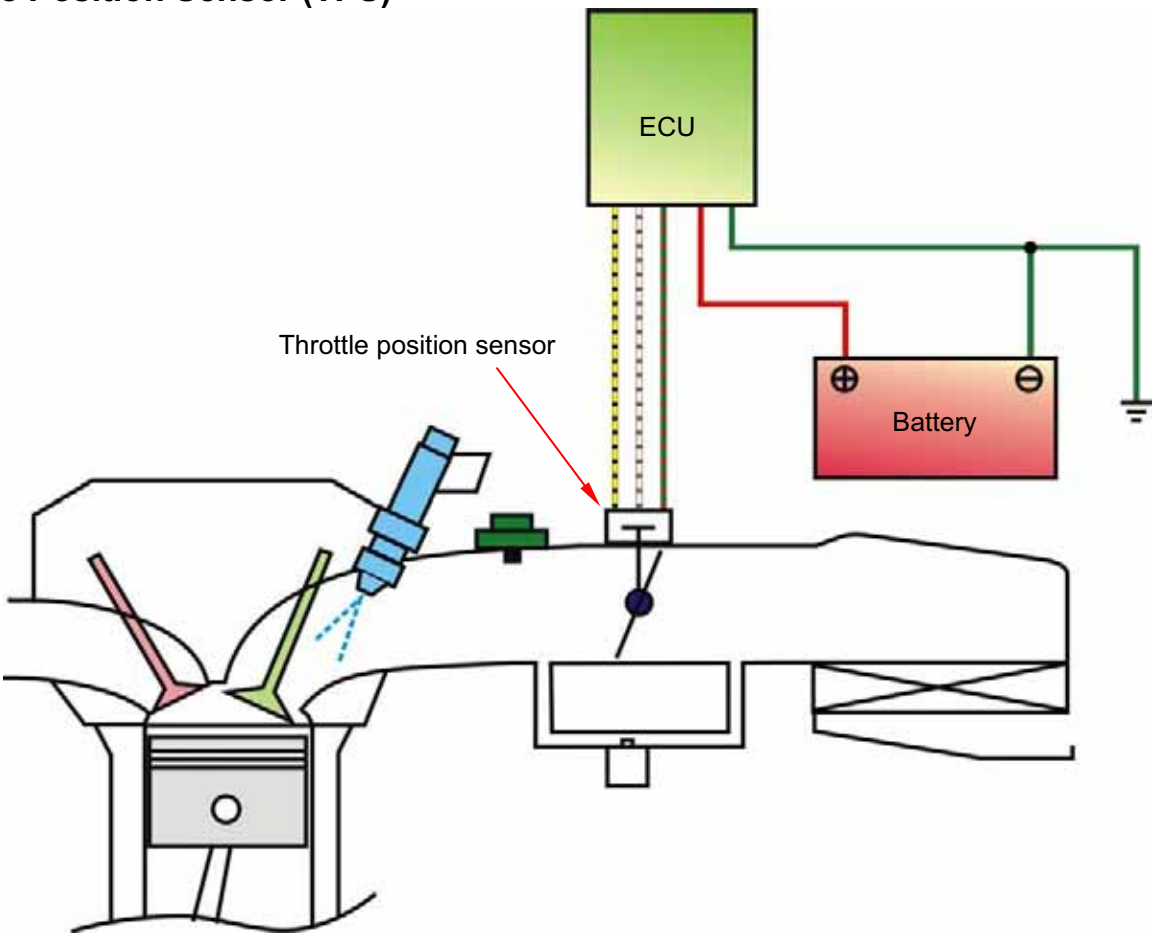


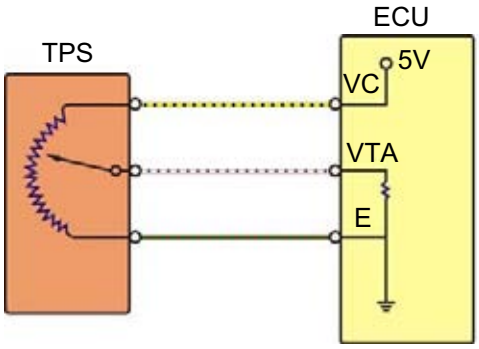
Function:

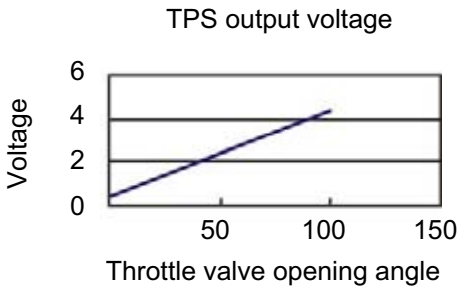
O_2 Sensor measures the proportion of oxygen in the exhaust gas, sending signals to ECU which adjusts the air-fuel ratio by changing the fuel injection time. If the proportion of oxygen is too low, it means the rich air-fuel mixture with higher HC & CO concentration in the exhaust gas. If the proportion of oxygen is too high, it means the lean air-fuel mixture with higher temperature and higher NOx concentration.

1. O_2 Sensor outputs feedback signal to ECU which keeps the air-fuel mixture near the stoichometric ratio approximately 14.6 and forms the closed loop control system.
2. When the air-fuel mixture is near the stoichometic ratio, CO / HC / NOx are converted most efficiently.
3. O_2 Sensor heater resistance: 6.7 ~ 10.5 Ω
4. O_2 Sensor amendment in the voltage value: between 100 ~ 900 mV

Throttle Position Sensor (TPS)



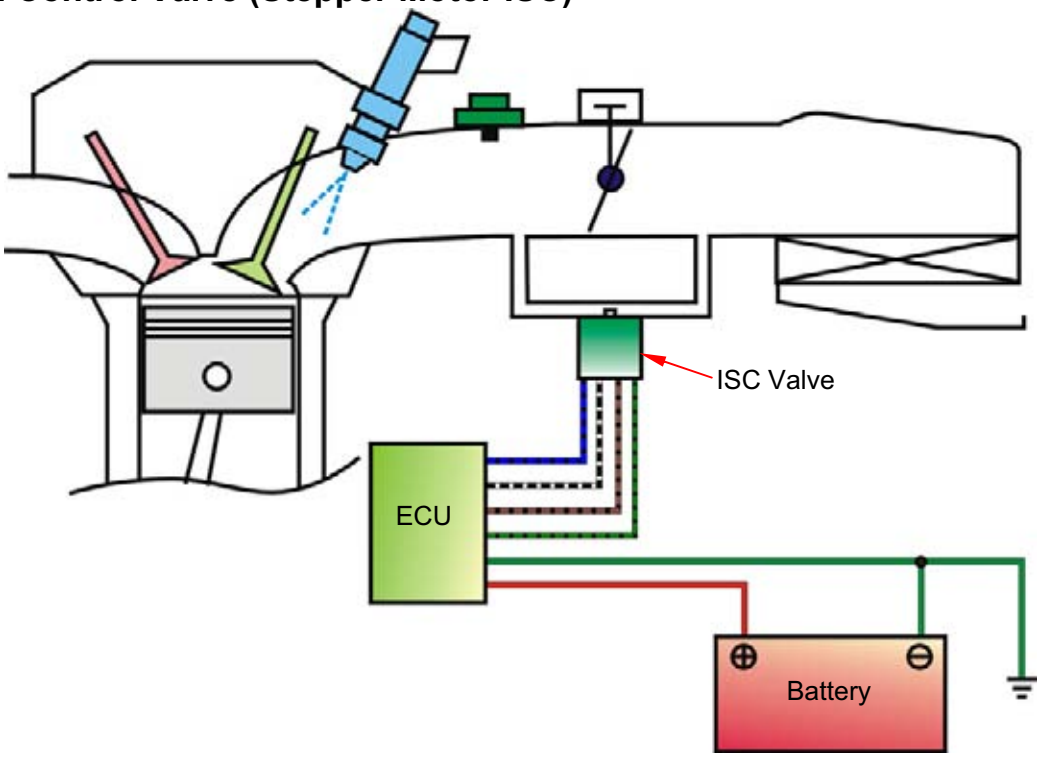


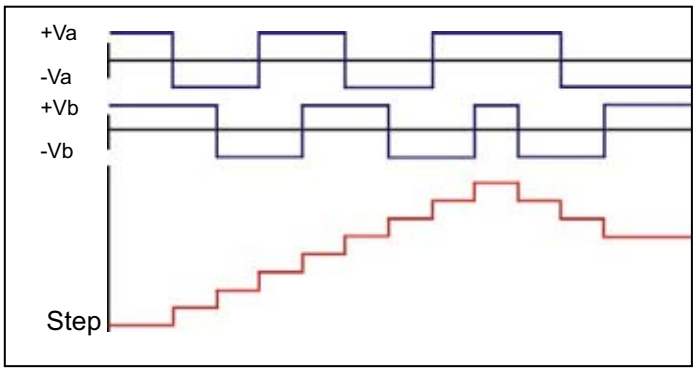


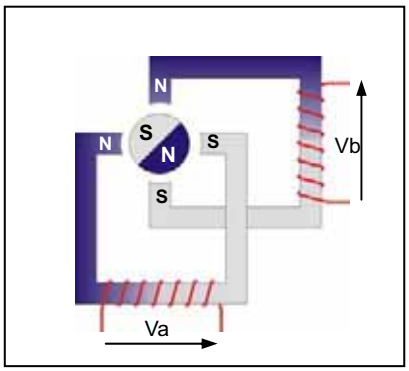
Basic Principle:
TPS is a rotary variable electric resistor. When it is rotated, both electric resistance and voltage value change, determining the throttle position.

Function:
TPS determines the throttle valve position and sends signal to ECU as reference of engine control.

Idle Speed Control Valve (Stepper Motor ISC)







Function:

ECU controls ISC stepper motor to adjust the bypass intake air quantity and stablize the idle speed.

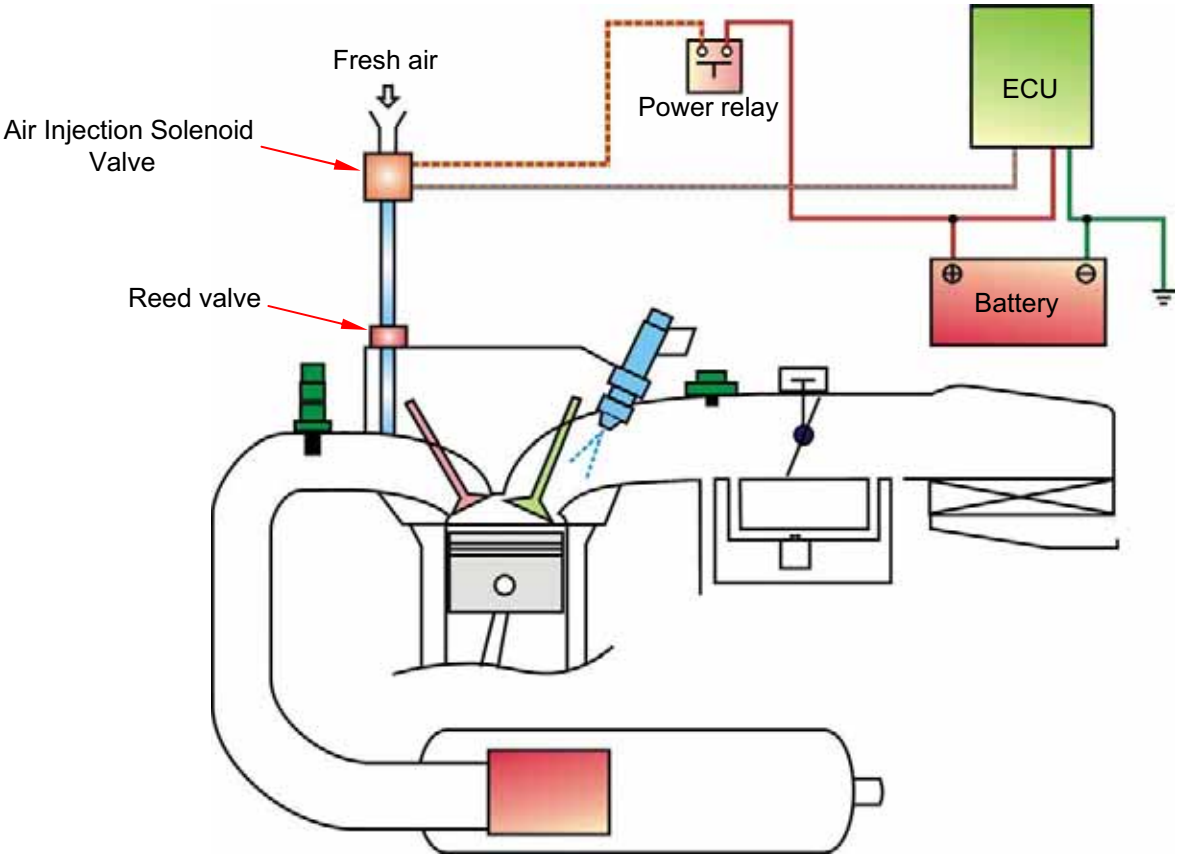
Air Injection Solenoid Valve (AISV)

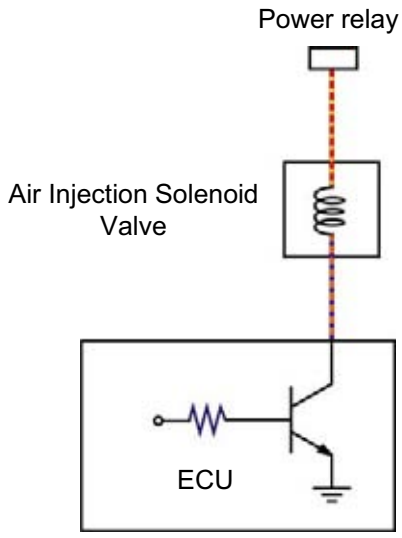
Function:

AISV introduces appropriate air quantity to reduce pollutant emission.

Basic Principle:

When the engine speed and throttle opening are higher than the default value, ECU controls AISV opening or closure.





Precautions in Operation

General Information

⚠ Warning

- Gasoline is a low fire point and explosive material. Always work in a well-ventilated place and flame is strictly prohibited when working with gasoline.
- Before dismantling fuel system parts, leak fuel out first, or grip the fuel pipe by using pliers to prevent fuel from splashing.

⚠ Cautions

- Do not bend or twist the throttle cable. Damaged cable will lead to unstable driving.
- When disassembling fuel system parts, pay attention to O-ring position, replace with new one as re-assembly.

Specification

Item	Specifications
Idle Speed	1650±100 rpm
Throttle free play	2~6 mm
Fuel pressure	294±6kpr (about 3.0kg/cm²)

Torque value

TW Sensor: 0.74~0.88 kgf-m
O_2 Sensor: 3.6~4.6 kgf-m

Special Tools

Vacuum Gauge
Fuel Pressure Gauge
EFi System Diagnostic Scanner
Fuel Pipe Pliers

Fuel Injection System Components Description

ECU (Engine Control Unit)

Function Description:

- Powered by DC 8~16V, and has 36-pin socket on the unit.
- The hardware component consists of a 16-bit microcomputer that is its control center. It contains the functional circuit interface of engine condition sensing and the driving actuator for the fuel injector, fuel pump, as well as ignition coil.
- Its major software is a monitor strategy operation program that includes controlling strategy and self-diagnosis programs.

Testing Procedures:

1. Connect the diagnostic scanner to the diagnostic coupler on the vehicle.
2. Key-on but not to start engine, confirm ECU and the diagnostic scanner can be connected or not.
3. Diagnostic scanner will automatically display Version "certification" of the screen.
4. Confirm the application model, version is correct or not.
5. Check if the fault codes exist.
6. Remove the fault codes.
7. Start engine and check the parameters shown on the diagnostic scanner.

Detection Judgement:

- Fault codes can be read and cleaned, and the fault codes will not appear again after re-start.

Treatment of abnormal phenomena:

1. Can not connect→ First check whether the cartridge is correct and ECU is normal or not.
2. Unable to start→ECU or relevant parts abnormal. Re-confirm after the replacement of abnormal parts.
3. Fault codes appear→ ECU or relevant parts abnormal. Troubleshoot and re-confirm.

Throttle Body

Functional Description:

- Throttle body is the inlet air flow regulating device (similar to the carburetor).
- Throttle valve pivot drives the throttle position sensor synchronously and makes ECU detect the throttle opening immediately.
- Throttle valve positioning screw has been adjusted and marked on the production line. Readjustment is not suggested.

Throttle valve positioning screw

Treatment of abnormal phenomena:

- If all fuel injection associated components identified no adverse, and other traditional engine components are also normal, the engine is still not smooth, please confirm whether the throttle body coke serious.
- If coke serious, please clean throttle body, and then adjust the injection system.

MAP Sensor

Working voltage measurement

Output voltage measurement plains

Functional Description:

- Powered by 5V DC from ECU. It has 3-pin socket on the sensor. One terminal is for power, and 1 terminal are for signal output. And, the rest one is for ground.
- The major component of the intake pressure sensor is a variable transistor IC. Its reference voltage is DC 5V, and output voltage range is DC 0~5V.
- It is a sensor by sensing pressure, and can measure the absolute pressure in intake process. It also conducts fuel injection quantity correction based on environmental position level.

Pin	Wire color	Function
Left	Yellor / Black	5V voltage input
center	Black / Red	Signal output
Right	Green / Red	Ground

Testing Procedures:

1. Inlet pressure sensor connector to properly (using the probe tool).
2. Open the main switch, but not to start engine.
3. Use "volteg meter" DC stalls (DCV) to check inlet pressure sensor voltage.
4. Confirmed working voltage:
   - Volteg meter negative access to the inlet pressure sensor third pin (Green / Red).
   - Voltage meter positive access to the inlet pressure sensor first pin (Yellow / Black).
5. Confirmed plains output voltage values:
   - Volteg meter negative access to the inlet pressure sensor third pin (Green / Red).
   - Voltage meter positive access to the inlet pressure sensor second pin (Black / Red)

⚠ Cautions

- Attentions to the tools required close to the probe wire waterproof apron penetrate skin and internal terminal before measurements to the correct value.

Detection judge:

- Working voltage value: 5.0±0.1V
- Plains output voltage values: 2.87±0.03V (Conditions: In the plains 101.3 kpa Measurement)

⚠ Cautions

- The higher the altitude, the measurement value to the lower voltage.
- Sea-level atmospheric pressure = 1Atm = 101.3kpa = 760mmHg = 1013mbar

Treatment of abnormal phenomena:

- Inlet pressure sensor damaged, or poor contact couplers.
- Check whether the abnormal wire harness lines.
- Inlet pressure sensor anomaly, the proposed replacement of the sensor to measure the output voltage.
- ECU anomaly, the proposed replacement of the ECU to measure the working voltage.

TA Sensor

Functional Description:

- Use ECU DC 5V power supply provided, has the two-pin coupler, a voltage output pin; another one for a grounding pin.
- Its main component is a negative temperature coefficient (resistance temperature rise smaller) thermistor.
- Installed in the air cleaner on the intake temperature sensor within the resistance, with the induction to the temperature change, and converted into voltage signals sent to the ECU then calculated the temperature and, in accordance with the ECU temperature and state amendments injection time and ignition angle.

Testing Procedures:

Resistance Value Measurement:

- Dismantled inlet temperature sensor connector.
- Use of the "Ohmmeter" Ohm stalls, inspection sensor resistance.

Resistance value measurement

Detection judge:

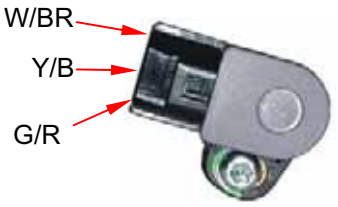
Resistance value and the temperature between relationships as follows

Temperature (℃)	Resistance value (KΩ)
-20	18.8 ± 2.4
40	1.136 ± 0.1
100	0.1553 ± 0.007

Treatment of abnormal phenomena:

- Temperature sensor damage or connector poor contact.
- Check whether the abnormal wire harness lines.
- Temperature sensor anomaly, the proposed replacement of the temperature sensor.

TPS



Functional Description:

- Use ECU provided DC 5V power supply, has the three-pin coupler, one for the power supply pin; one for a voltage output pin; one for a grounding pin.
- Its main component is a sophisticated type of variable resistor.
- Installed on the throttle body beside the throttle through (the accelerator) rotates, the output of linear voltage signal provided ECU perception and judgement then throttle position (opening), and in this signal with have the most appropriate fuel injection and ignition timing control.

Pins	Wire color	Function
Upper	White / Brown	Signal output
Center	Yellow / Black	5V voltage input
Under	Green / Red	Ground

Working voltage measurement

Testing Procedures:

1. Sensor connector to properly (using the probe tool), or can be removed connector to voltage measurements (direct measurement).
2. Opened the main switch, but not to start engine.
3. Use "volteg meter" DC stalls (DCV) to check sensor voltage.
4. Confirmed working voltage:
   - Volteg meter negative access to the inlet pressure sensor third pin (Green / Red).
   - Voltage meter positive access to the inlet pressure sensor first pin (Yellow / Black).
5. Throttle output signal recognition (using the probe tool)
   - Volteg meter negative access to the sensor third pin (Green / Red).
   - Voltage meter positive access to the sensor first pin (white / Brown).
   - Measurements were full throttle at full throttle closed the values of the output voltage.

Throttle output signal measurement - full closed

⚠ Cautions

- Attentions to the tools required close to the probe wire waterproof apron penetrate skin and internal terminal before measurements to the correct value.

Throttle output signal measurement - full

Detection judge:

- Working voltage value: 5.0±0.1V
- Full throttle voltage value: 0.6±0.02V
- Full throttle closed voltage value: 3.77±0.1V

(01/03) Data stream
Engine SPD 1650 RPM (Idle:1550~1750)
FAULT NO. 0 (Normal 1:0)
BATT. VOLT 14.1 V (Above 12V)
FUEL PUMP ON (Idle:ON)
MAP 35 Kpa (Idle:32~38Kpa)
TPS position 0% (Idle: ≤1.5%)
TPS position 0.2V (Idle: 0.58~0.62)
O2 SENSOR 130mV (Idle: 50~200mV)
O2 HEATER OFF (>3500rpm=ON)
ENGINE TEMP 90℃ (Stable:85~95℃)
UP prev DOWN next Ent fixed F4 waveform
EXIT exit LEFT PgUp RIGHT PgDn F1 Help

Throttle output signal measurement

Also, can be used for diagnosis tool confirm to the throttle output signal.

1. Connected to the "diagnosis tool", and open the main switch, but not to start engine.
2. "Diagnosis tool" screen switches to a "data analysis (01 / 03)" screen.
3. Rotations throttle and check voltages.

Treatment of abnormal phenomena:

- Throttle sensor damage or connector poor contact.
- Check whether the abnormal wire harness lines.
- Throttle sensor anomaly, the proposed replacement of the throttle sensor to measure the voltage.

⚠ Warning

- Throttle sensor prohibited removed from the throttle body to do any testing.

TW Sensor (Engine Coolant Temperature Sensor)

Functional Description:

- Powered by 5V DC from ECU. It has the two-pin socket on the sensor. One terminal is for power output, and 1 terminal are for ground.
- Its main component is a negative temperature coefficient (resistance temperature rise smaller) thermistor.
- Installed in the cylinder head, the engine temperature sensor resistance, with the induction to the temperature change, and converted into voltage signals sent to the ECU was calculated engine temperature, ECU accordance with the engine warm up to amendment the injection time and ignition angle.

Resistivity measurements

Testing Procedures:

- Dismantled engine temperature sensor.
- Use of the "meter" Ohm stalls, inspection sensor resistance.

Detection judge:

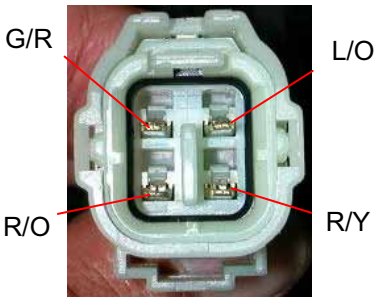
Resistance value and the temperature between relationships as follows:

Temperature (℃)	Resistance value (KΩ)
-20	18.8 ± 2.4
40	1.136 ± 0.1
100	0.1553 ± 0.007

Treatment of abnormal phenomena:

- Temperature sensor damage or couplers to poor contact.
- Check whether the abnormal wire harness lines.
- Temperature sensor anomaly, the proposed replacement of the temperature sensor.

O_2 Sensor



Functional Description:

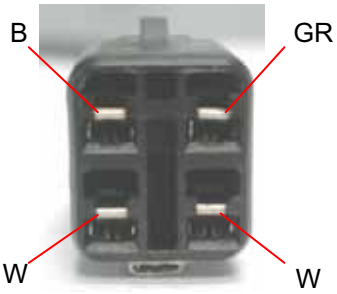
- Use 8 ~ 16V DC power supply, has the 4-pin coupler, a power supply pins for heater; for a heater control pin; signal for a grounding pin; O_2 for a signal pin.
- O_2 Sensor output feedback signal to the ECU fuel ratio control in the vicinity of 14.5 ~ 14.7, a closed-loop fuel control.
- When the air-fuel ratio control in the near equivalent, CO / HC / Nox to have the highest conversion efficiency.

Testing Procedures:

1. Voltage confirmed:

- Removed O_2 Sensor and the wire harness between the coupler.
- Open the main switch, but not to start engine.
- Use "volteg meter" DC stalls (DCV) to check inlet pressure sensor voltage.
- Confirmed working voltage:
  Volteg meter negative access to the wire harness sensor coupler 2nd pin (Red / Orange).
  Voltage meter positive access to the wire harness sensor coupler first pin (Red / Yellow).

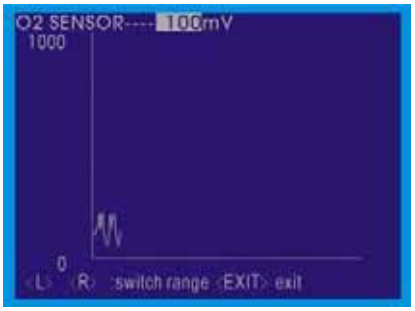
Confirmed working voltage



2. Resistance Confirmation:

- Remove O_2 Sensor and the wire harness between the coupler.
- Use of the "meter" Ohm stalls, Measurement O_2 Sensor heater resistance.
- Measurement resistance value
  Ohm meter negative access to the O_2 sensor coupler 2nd pin (White).
  Ohm meter negative access to the O_2 sensor coupler first pin (White).

Resistance Confirmation



Numerical voltage changes that the situation.

3. Used the diagnosis tool to confirm of O_2 sensor work situations:

- Connected the "diagnosis tool" to diagnosis coupler and open the main switch to start the engine.
- Engine to be completely warm-up (idling state operation "5 minutes" above).
- Screen will switch to the diagnosis tool of "DATA STREAM 01/01" screen, select " O_2 Sensor" project, and switches to a wave of images, turn the throttle engine speed to about 4500 rpm, Observation O_2 Sensor actuator circumstances.
- Observation O_2 Sensor voltage values that the situation changes.

Detection judge:

- Working voltage value: above 10V
- Resistance value: 6.7~10.5Ω
- O_2 Sensor amendment in the voltage value of between 100 ~ 900 mV beating; representatives pollution closed-loop control system to normal, if contrary to maintain a fixed value for abnormalities.

Treatment of abnormal phenomena:

- O_2 sensor damage, heater damaged or couplers to poor contact.
- Check whether the abnormal wire harness lines.
- O_2 Sensor anomaly, the proposed replacement of the O_2 Sensor，and measurements again.

Roll Over Sensor

Functional Description:

- Control power of the power relay coil, has the three-pin socket.
- When vehicles lean angle greater than 65 degrees, roll over sensor will be the implementation of ECU system power off. At this point once again to restart the engine, the need to re-open a main switch.
- This as a safety device, when the dumping of vehicles, be cut off power supply of ECU, and engine stop.

Testing Procedures:

- Because of the roll over sensor for the electronic control agencies, not against removed after a single measurement.
- Normal state, after power is turned on the main switch, measurement of ECU power relays red / yellow line to the Green Line (ground), the power supply voltage measurement can determine whether it is normal for the roll over sensor.

Detection judge:

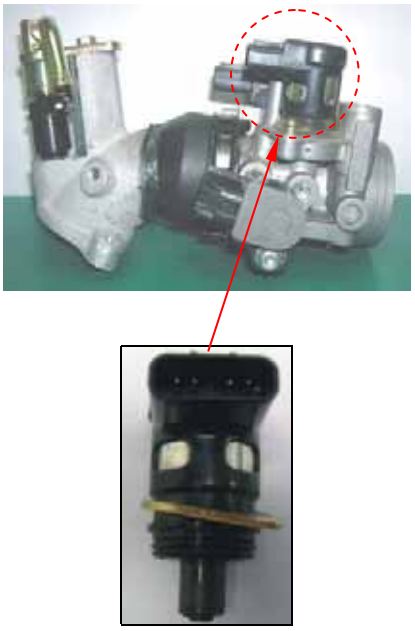
Voltage: Supply voltage = Battery voltage

Treatment of abnormal phenomena:

Vehicle state vertical, power relays or ECU without electricity supply.

- Roll over sensor internal short circuit or open circuit, or coupler bad contact.
- Check whether the abnormal wire harness lines.
- Roll over sensor anomaly, the proposed replacement of the roll over sensor.

ISC Valve (stepper motor) :



Functional Description:

- Use ECU provided power, has the four-pin socket.
- 4-pin coupler for the two motor coils of the power supply and grounding wire, grounding ECU power through the control and management of the stepper motor actuators.
- If it's mainly low-power DC motors, drives idle speed control valve (ISC) of the movement to adjust the idle air flow channel size, control of idle speed of the engine in the cold or hot.

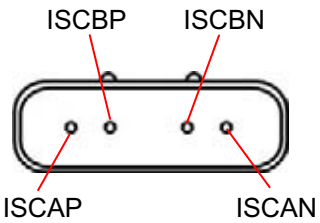
Testing Procedures 1:

Resistance Confirmation:

- Idle Air Control Valve will be demolished down coupler (directly in the body, can also measure).
- Use of the "meter" Ohm stalls (Ω), measurement of the two step motor coil resistance values.
  A phase: ISCAP and ISCAN
  B phase: ISCBP and ISCBN

Inspection of the actuation (testing can only be on engine, not a single test):

- Closure of the main switch.
- Use hand to touch Idle Air Control Valve body.
- Open the main switch.
- Feeling the Idle Air Control Valve Actuation.



ISC PINS

⚠ Cautions

- Dynamic checking for Idle Air Control valve, can only be tested on the engine, not a single test.

Detection judge:

1. Resistance value:
   A phase: 80 ± 10Ω (Environmental conditions: 15 ~ 25 ℃)
   B phase: 80 ± 10Ω (Environmental conditions: 15 ~ 25 ℃)
2. Actuator inspection:
   In the above steps Idle Air Control Valve (ISC) Idling motor actuator control of inspection, ISC will be slightly vibration or "… da… da…" continuous voice.

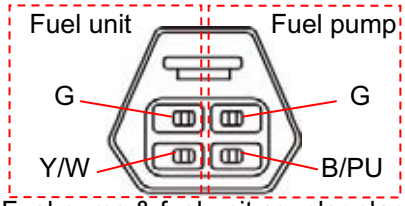
A phase measurement of the resistance value

Treatment of abnormal phenomena:

- Idle air control valve damage, or poor coupler contact.
- Check whether the abnormal wire harness lines.
- Idle Air Control Valve anomaly, the proposed replacement of the Idle Air Control Valve, further inspection of its actuator.

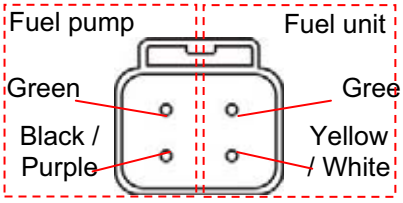
B phase measurement of the resistance value

Fuel Pump



Fuel pump & fuel unit coupler plan

Confirmed working voltage



Harness-face coupler plan

Resistance Confirmation

Functional Description:

- Powered by DC 8~16V, and has four-pin socket on the pump.
- The two terminals are connected to power source and ground respective. The ECU is to control and manage the operation of fuel pump through electrical power.
- Its major component is a driving fan pump that equipped with a low electrical consuming DC motor. Powered by 12V voltage and keep fuel pressure inside the fuel pump in 294±6kpa (about 3 kg / cm^2).
- The fuel pump is located inside of the fuel tank, and installed a filter in front of its inlet so that can prevent from foreign materials sucking into the fuel pump to damage it and the fuel injector.

Testing Procedures 1:

Fuel pump working voltage confirmed:

- Fuel pump coupler to properly (using the probe tool), or can be removed coupler working voltage measurements (direct measurement).
- Open the main switch, but not to start engine.
- Use "volteg meter" DC stalls (DCV) to check fuel pump voltage.
- Confirmed working voltage:
  Volteg meter negative access to the wire harness fuel pump coupler 2nd pin (Green).
  Voltage meter positive access to the wire harness fuel pump coupler first pin (Black / Purple).

⚠ Cautions

- Conducting fuel pump voltage measurement, if the main switch to open three seconds after the engine did not started, the ECU will automatically cut off the fuel pump power supply.

Detection judge 1:

1. Working voltage value: Above 10V
2. Resistance value: 1.5±0.5Ω
3. Fuel pressure: 294±6kPa (about 3kg/cm^2)

Testing Procedures 2:

Resistance Confirmation:

- Removed coupler on the fuel pump.
- Use of the "meter" Ohm stalls, Measurement fuel unit resistance (Yellow / White & Green).

Detection judge 2:

- Fuel unit resistance value: 4~107.5Ω

Fuel system pressure measurement

Testing Procedures 3:

Fuel pressure measurement:

- Use fuel pressure gauge, connected in series between the injector and the fuel tank.

⚠ Cautions

- In the implementation of the fuel pressure measurement, will go to the demolition of the fuel hose, such as: injector or fuel pump hose, hydraulic measurements after, be sure to confirm whether there is a leakage of fuel situation in order to avoid danger.

Fuel pressure measurement demolition - injector

Detection judge 3:

1. Fuel pressure: 294±6kPa (about 3kg/cm^2)

Treatment of abnormal phenomena:

1. Fuel pump damage internal coil break, or coupler bad contact.
2. Fuel filter blockage.
3. Fuel pump anomaly, the proposed replacement of the fuel pump.
4. Fuel unit anomaly, the proposed replacement of the fuel unit.

Fuel pressure measurement demolition - fuel pump

Fuel Injector

Functional Description:

- Powered by DC 8~16V, and has two-pin socket on the injector.
- Its major component is the solenoid valve of high resistance driven by electronic current.
- The two terminals are connected to power source and ground respective. It is controlled by ECU to decide the injection timing, and the injector pulse width.

Injector resistance confirmation

Testing Procedures:

1. Resistance Confirmation:
   Use of the "meter" Ohm stalls (Ω), measurement of the injector resistance value.

2. Injector injection state examination:
   - Removed the injector fixed bolt and removed the injector from intake manifold, but not removal of harness coupler.
   - Injector and injector cap tightly by hands, fuel spills should not be the case.
   - Key-on and start the engine, injector injection state examination.

Detection judge:

1. Between the two pin resistance values: 11.7±0.6Ω
2. injection state:
   - Fuel atomizing good, with a clear scattering angle → judged as normal.
   - Injection-state such as water, no obvious scattering angle → found abnormal.

Injection-state atomizing good

Treatment of abnormal phenomena:

1. Injector abnormal, the proposed replacement of the new one injector.
2. Injection-state abnormal, for the following reasons:
   - Injector obstructive→the proposed replacement of the new one injector.
   - Fuel pressure shortage → confirmed hydraulic pressure, the proposed replacement fuel pump to confirm.

Injection-state unusual

⚠ Warning

- Gasoline is lower ignited explosive materials, in the ventilation premises operations, and prohibited fire.
- In the inspection injector fuel injection state, the outflow of gasoline, and the application of appropriate collection containers, so as to avoid danger.

Ignition coil

First circuit coil resistance measurement

Functional Description:

- Use 8 ~ 16V DC power supply, has the two-pin socket.
- Two-pin socket for the power supply and grounding. Its main components for the high conversion ratio transformer.
- Through computer programs when the ignition is controlled, from ignition timing (TDC) / crank position sensor, the throttle valve position sensor, engine temperature sensor, the inlet pressure sensor and O_2 Sensor, issued by the signal, with the engine Speed through the ECU to determine the appropriate ignition is, by the current of a crystal intermittent control, a 25000-30000 volts of secondary hypertension, flashover triggered spark plug, this approach will not only enable the engine to achieve maximum output function, also help to improve the efficiency of fuel consumption and pollution improvements.

Testing Procedures:

Resistance Confirmation:

- Removed coil first circuit plugs on the ignition coil (Red / Yellow & Black / Yellow).
- Use of the "meter" Ohm stalls (Ω), measurement of the ignition coil resistance value.

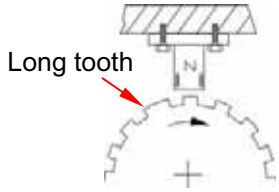
Detection judge:

- Ignition coil primary circuit: 2.8±15% Ω(20ºC)

Treatment of abnormal phenomena:

1. Ignition coil internal coil disconnection damaged, or plugs bad contact.
2. Ignition coil ignition is not abnormal, proposes to replace the ignition coil.

CPS



Measurement resistance value

Functional Description:

- Do not need for an external power supply, has two-pin of signal plug.
- Constitutes a major change in its reluctance induction coil.
- The spacing of flywheel and sensor should be 0.7 to 1.1 mm.
- Magnetic induction sensor is the use of flywheel on the Gear (23 +1 long tooth) rotary cutting induction coil changes in the magnetic field sensor with the inductive voltage signal for ECU judgement, calculated at the engine speed and crankshaft position, and with a most appropriate time of fuel injection and ignition control.

Testing Procedures:

Resistance Confirmation:

- Removed crankshaft position sensor coupler (Blue / Yellow & Green / White).
- Use of the "meter" Ohm stalls (Ω), measurement of the crankshaft position sensor resistance value.

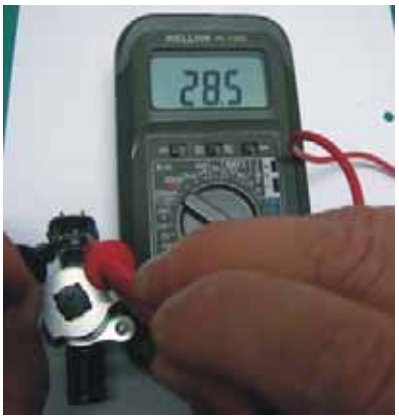
Detection judge:

- Resistance value: 80~160Ω(20ºC)

Treatment of abnormal phenomena:

1. Sensor internal coil interrupted damaged, or coupler bad contact.
2. Check whether the abnormal wire harness lines.
3. Sensor coil anomaly, the proposed replacement of the new one.

AISV



Functional Description:

- Control power, has two-pin socket, one for the power supply pin, one for grounding pin.
- Secondary air injection solenoid valve at the Idle (3500 rpm below) actuator.
- At Idling, ECU control solenoid valve by the grounding circuit to be moving or closing.

Testing Procedures:

Resistance Confirmation:

- Use of the "meter" Ohm stalls (Ω), measurement of the secondary air injection solenoid valve resistance value.

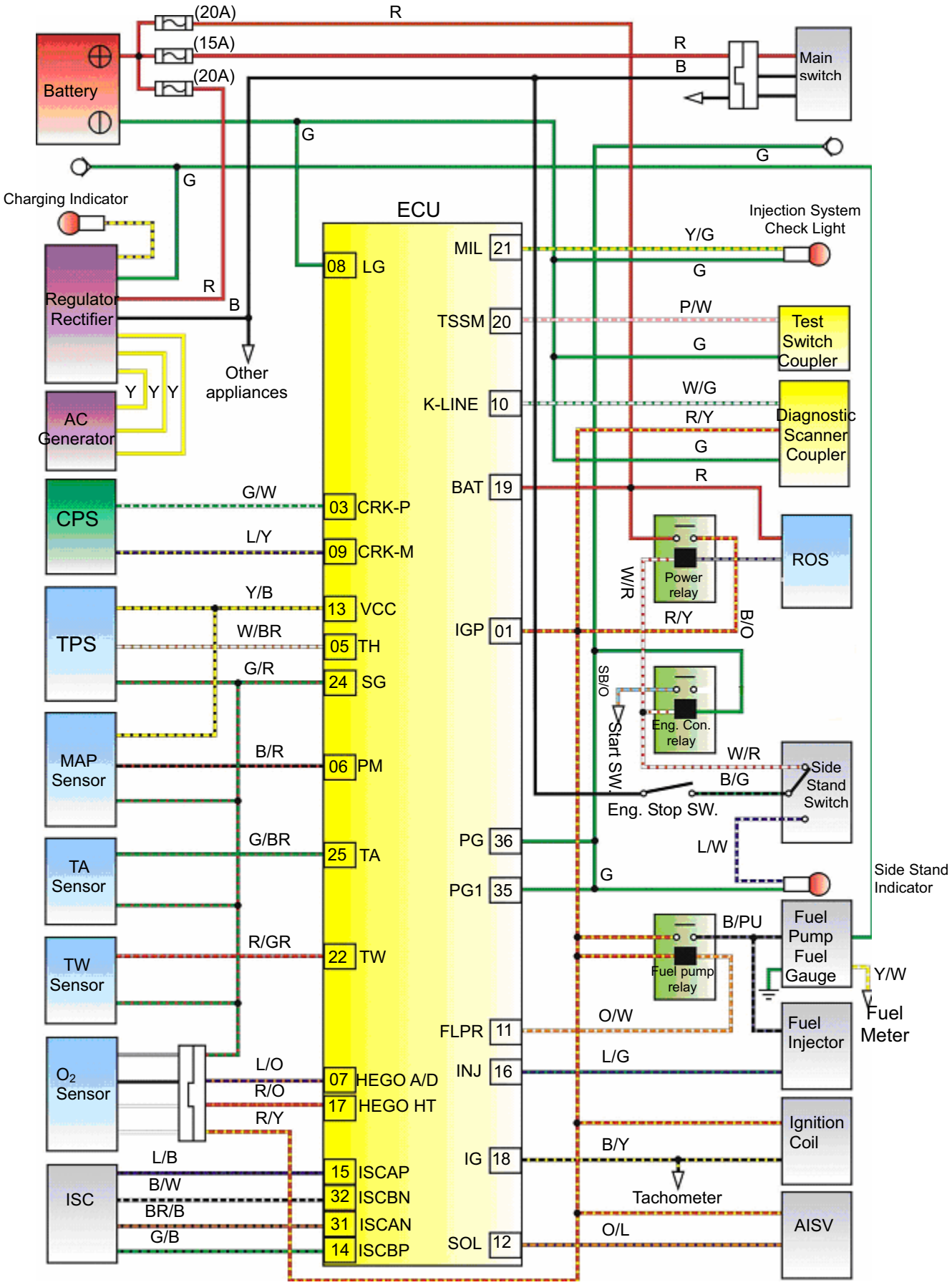
Detection judge:

Resistance value = 26Ω ± 2.6Ω(於 20℃)

Treatment of abnormal phenomena:

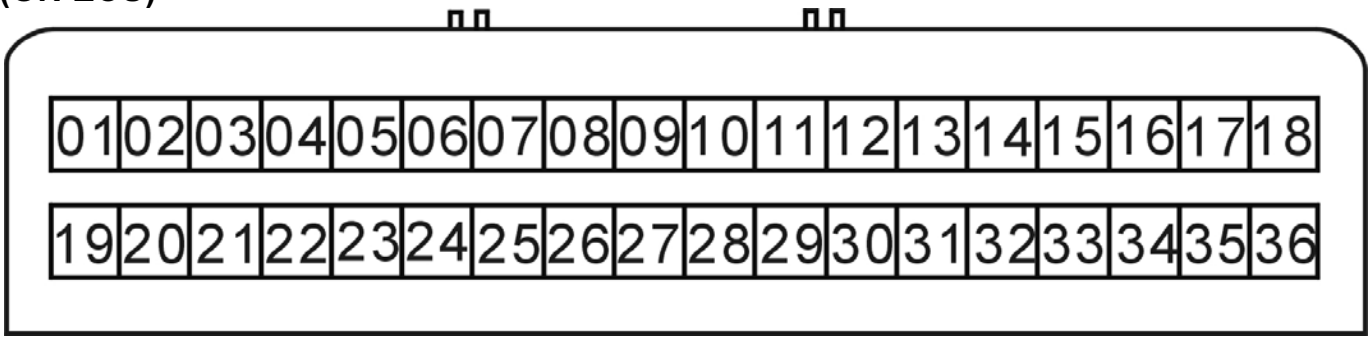
- Secondary air injection solenoid valve internal short circuit or open circuit, or coupler bad contact.
- Check whether the abnormal wire harness lines.
- Secondary air injection solenoid valve anomaly, the proposed replacement of the new one.

Fuel Injection System Circuit



ECU Pin Configuration

(ON ECU)

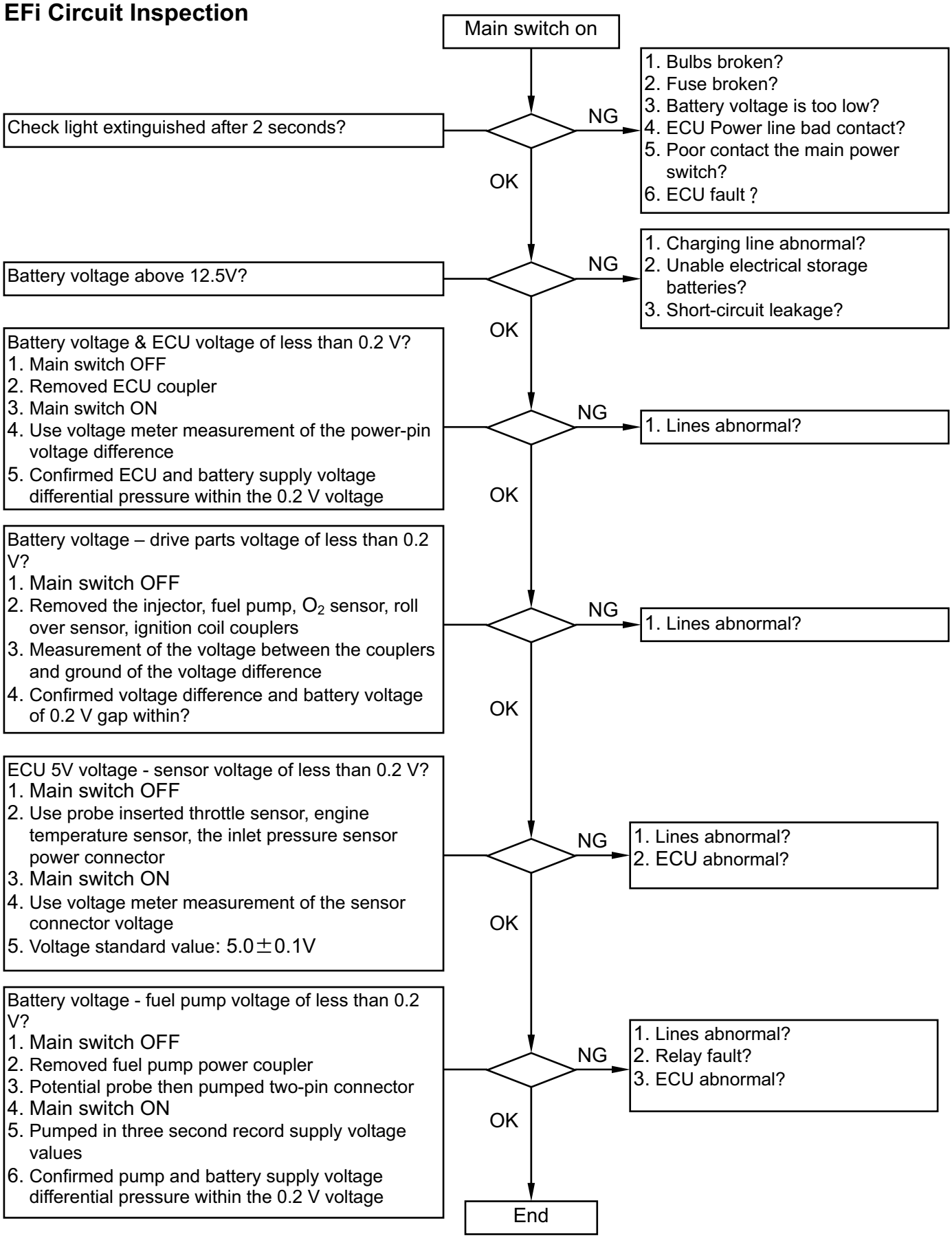


ECU Pin Note

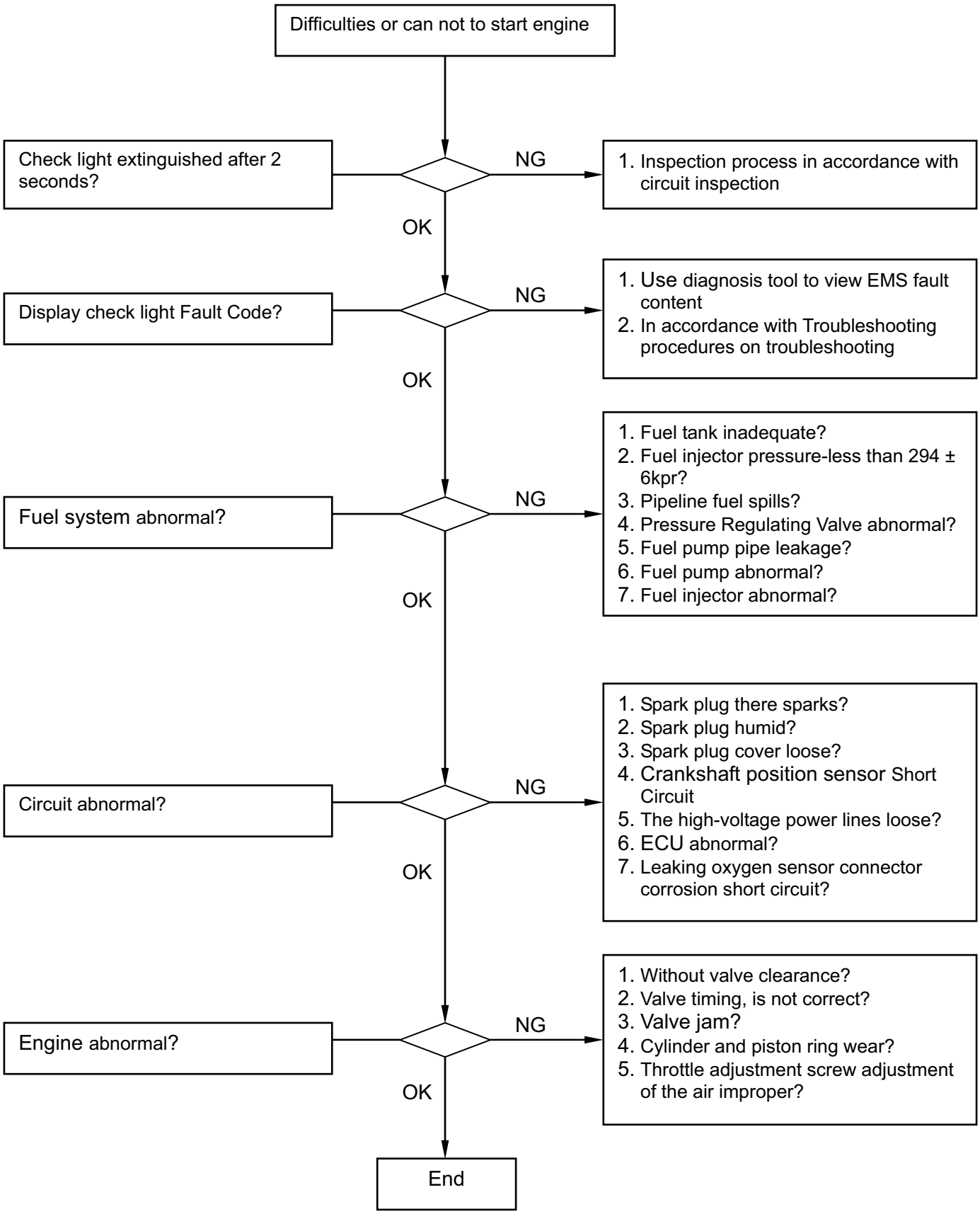
Pin NO.	Wire color	Pin code	Note	Pin NO.	Wire color	Pin code	Note
01	R/Y	IGP	Drive components Power +	19	R	BAT	ECU power +
02			No use	20	Pink	TSSM	Test switch signal (A/D)
03	G/W	CRK-P	Crankshaft Position Sensor-	21	Y/G	MIL	Warning Lights O/P
04			No use	22	R/GR	TW	Eng. Temp. Sensor (A/D)
05	W/BR	TH	Throttle angle [A/D]	23			No use
06	B/R	PM	Manifold Press. SNSR I/P [A/D]	24	G/R	SG	Sensor ground
07	L/O	HEGO A/D	O_2 Sensor [A/D]	25	G/BR	TA	Inlet air temperature sensor (A/D)
08	G	LG	ECU ground	26			No use
09	L/Y	CRK-M	Crankshaft Position Sensor+	27			No use
10	W/G	K-LINE	Sequence transmission signal output / input	28			No use
11	O/W	FLPR	Fue pump relay O/P	29			No use
12	O/L	SOL	2^{nd} air solenoid valve O/P	30			No use
13	Y/B	VCC	Sensor power + (DC 5V)	31	BR/B	ISCAN	Step motor A phase power -
14	G/B	ISCBP	Step motor A phase power +	32	B/W	ISCBN	Step motor B phase power -
15	L/B	ISCAP	Step motor B phase power +	33			No use
16	L/G	INJ	Fuel injector O/P	34			No use
17	R/O	HEGO HT	O_2 Sensor heater ground	35	G	PG1	Drive components ground
18	B/Y	IG	Ignition coil O/P	36	G	PG	Drive components ground

Fault Diagnosis

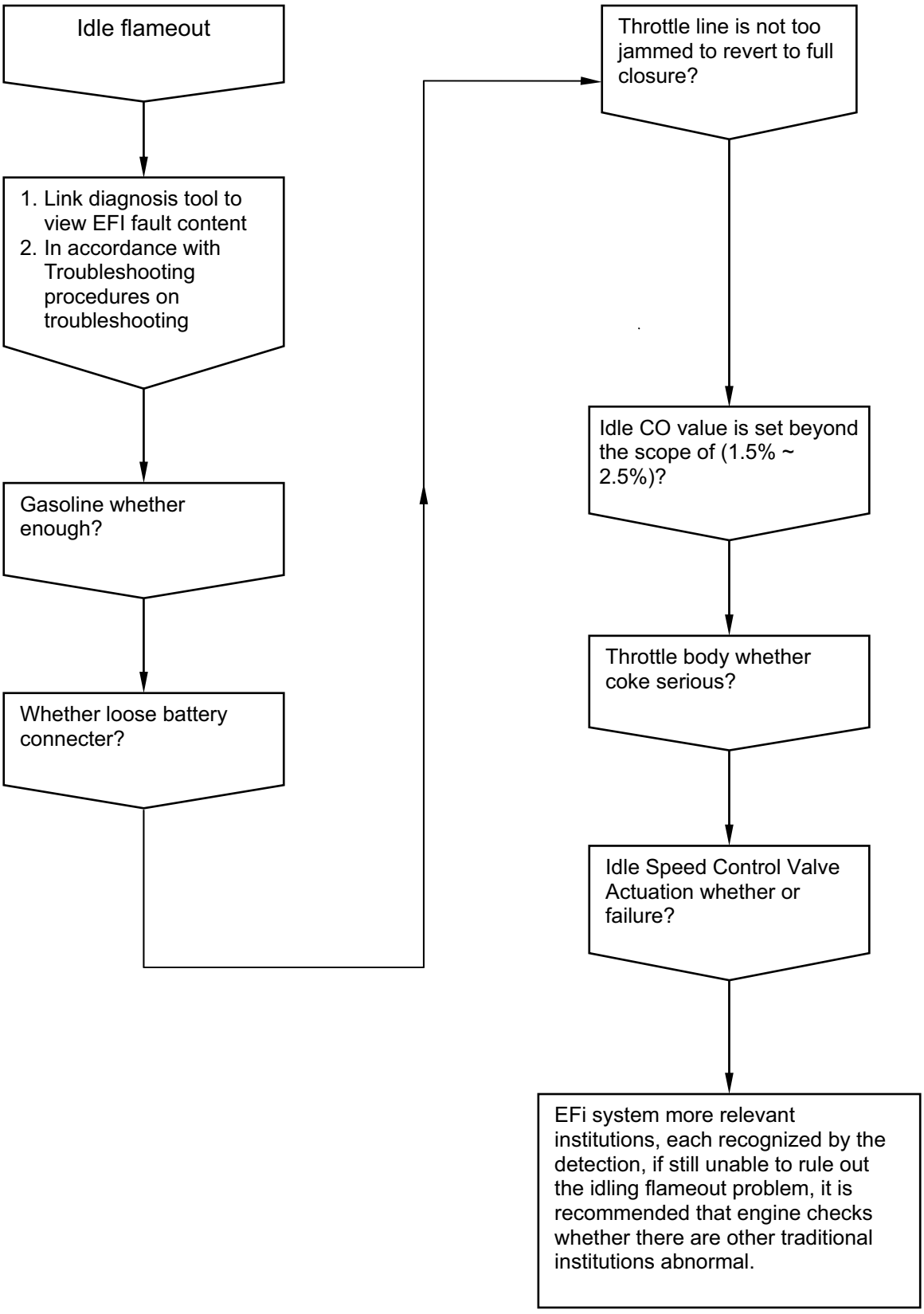
EFi Circuit Inspection


Main switch on
Check light extinguished after 2 seconds?
NG
1. Bulbs broken?
2. Fuse broken?
3. Battery voltage is too low?
4. ECU Power line bad contact?
5. Poor contact the main power switch?
6. ECU fault ?
OK
Battery voltage above 12.5V?
NG
1. Charging line abnormal?
2. Unable electrical storage batteries?
3. Short-circuit leakage?
OK
Battery voltage & ECU voltage of less than 0.2 V?
1. Main switch OFF
2. Removed ECU coupler
3. Main switch ON
4. Use voltage meter measurement of the power-pin voltage difference
5. Confirmed ECU and battery supply voltage differential pressure within the 0.2 V voltage
NG
1. Lines abnormal?
OK
Battery voltage – drive parts voltage of less than 0.2 V?
1. Main switch OFF
2. Removed the injector, fuel pump, O2 sensor, roll over sensor, ignition coil couplers
3. Measurement of the voltage between the couplers and ground of the voltage difference
4. Confirmed voltage difference and battery voltage of 0.2 V gap within?
NG
1. Lines abnormal?
OK
ECU 5V voltage - sensor voltage of less than 0.2 V?
1. Main switch OFF
2. Use probe inserted throttle sensor, engine temperature sensor, the inlet pressure sensor power connector
3. Main switch ON
4. Use voltage meter measurement of the sensor connector voltage
5. Voltage standard value: 5.0±0.1V
NG
1. Lines abnormal?
2. ECU abnormal?
OK
Battery voltage - fuel pump voltage of less than 0.2 V?
1. Main switch OFF
2. Removed fuel pump power coupler
3. Potential probe then pumped two-pin connector
4. Main switch ON
5. Pumped in three second record supply voltage values
6. Confirmed pump and battery supply voltage differential pressure within the 0.2 V voltage
NG
1. Lines abnormal?
2. Relay fault?
3. ECU abnormal?
OK
End

Can not Start the engine or difficult to start inspection

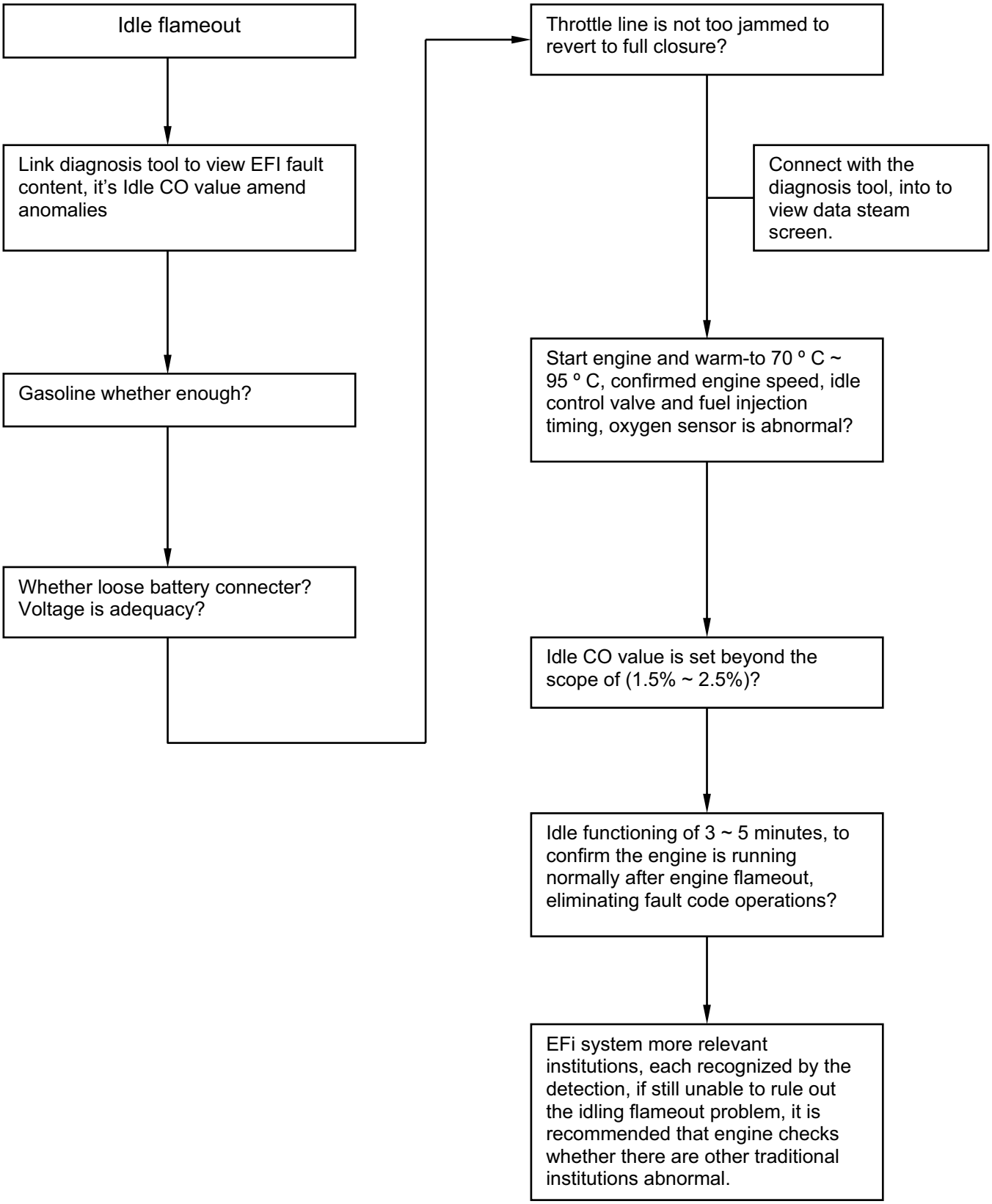

Difficulties or can not to start engine
Check light extinguished after 2 seconds?
NG
1. Inspection process in accordance with circuit inspection
OK
Display check light Fault Code?
NG
1. Use diagnosis tool to view EMS fault content
2. In accordance with Troubleshooting procedures on troubleshooting
OK
Fuel system abnormal?
NG
1. Fuel tank inadequate?
2. Fuel injector pressure-less than 294 ± 6kpr?
3. Pipeline fuel spills?
4. Pressure Regulating Valve abnormal?
5. Fuel pump pipe leakage?
6. Fuel pump abnormal?
7. Fuel injector abnormal?
OK
Circuit abnormal?
NG
1. Spark plug there sparks?
2. Spark plug humid?
3. Spark plug cover loose?
4. Crankshaft position sensor Short Circuit
5. The high-voltage power lines loose?
6. ECU abnormal?
7. Leaking oxygen sensor connector corrosion short circuit?
OK
Engine abnormal?
NG
1. Without valve clearance?
2. Valve timing, is not correct?
3. Valve jam?
4. Cylinder and piston ring wear?
5. Throttle adjustment screw adjustment of the air improper?
OK
End

Idle flameout diagnosis


Idle flameout
1. Link diagnosis tool to view EFI fault content
2. In accordance with Troubleshooting procedures on troubleshooting
Gasoline whether enough?
Whether loose battery connecter?
Throttle line is not too jammed to revert to full closure?
Idle CO value is set beyond the scope of (1.5% ~ 2.5%)?
Throttle body whether coke serious?
Idle Speed Control Valve Actuation whether or failure?
EFi system more relevant institutions, each recognized by the detection, if still unable to rule out the idling flameout problem, it is recommended that engine checks whether there are other traditional institutions abnormal.

CO value abnormal

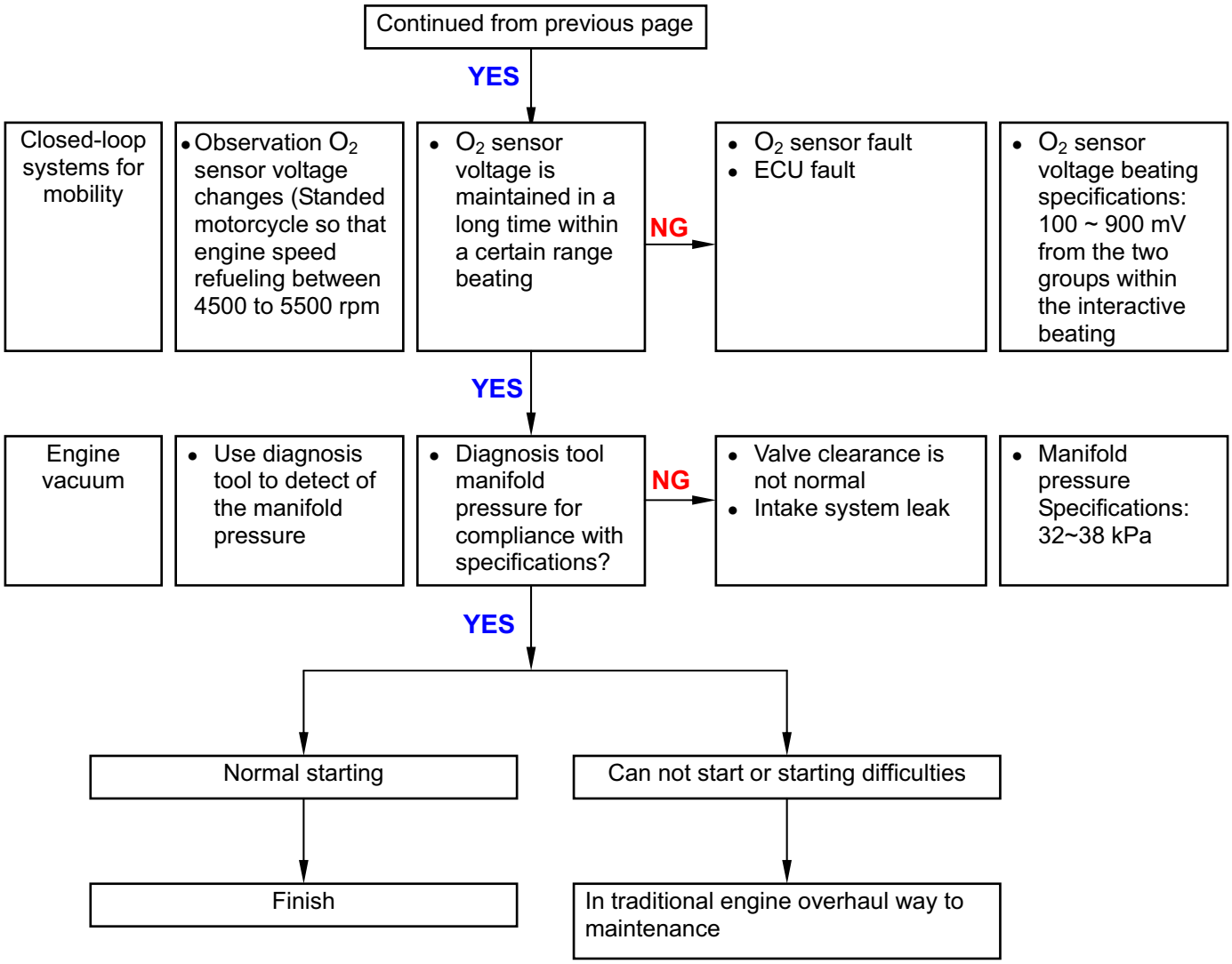
O_2 Sensor equipped with the system, in principle, not adjusted CO value, such as CO value deviated from the normal range, check O_2 Sensor and other agencies.


Idle flameout
Link diagnosis tool to view EFI fault content, it's Idle CO value amend anomalies
Gasoline whether enough?
Whether loose battery connecter? Voltage is adequacy?
Throttle line is not too jammed to revert to full closure?
Connect with the diagnosis tool, into to view data steam screen.
Start engine and warm-to 70 ° C ~ 95 ° C, confirmed engine speed, idle control valve and fuel injection timing, oxygen sensor is abnormal?
Idle CO value is set beyond the scope of (1.5% ~ 2.5%)?
Idle functioning of 3 ~ 5 minutes, to confirm the engine is running normally after engine flameout, eliminating fault code operations?
EFi system more relevant institutions, each recognized by the detection, if still unable to rule out the idling flameout problem, it is recommended that engine checks whether there are other traditional institutions abnormal.

Integrated Failure Diagnosis Program

Checking, adjusting Project	Detection of maintenance projects and steps	Fault status determination		Fault reasons	Parts specifications
Battery voltage	• Use meter direct measurement battery voltage • Use diagnosis tool detection battery voltage	• Battery voltage is 10 V above? • Diagnosis tool show whether the voltage of 10 V above?	NO	• Battery electricity • Battery connector loose • Harness circuit opening • ECU coupler not connected properly	• Diagnosis tool display voltage required to achieve more than 10 V
		YES			
Diagnosis fault code inspection	• Use of the diagnosis tool detection fault code • Elimination of fault codes, and then start engine	• Diagnostic tool show whether or not a fault code? • Fault Code cleared after show again?	YES	• TPS fault • ETS fault • CPS fault • MAP fault • O_2 sensor fault • ROS fault • ECU fault	• The sensor detection methods and specifications, please refer to repair manual
		NO			
Fuel quantity and fuel pressure	• Removed the injector on the intake manifold, but not removal of harness coupler. (Injector and injector cap tightly by hands, fuel spills should not be the case) • Start the engine • Examine whether injector fuel injection • Between the tank and injector installation the pressure gauge • check fuel pressure adequacy	• Injector whether injection? • Injector spray angle is normal? • Fuel pressure enough?	NO	• less than fuel tank • Injector fault • Fuel pump relay fault • Fuel pump fault • ECU fault • Fuel pump filter obstructive	• Pressure fuel specifications: Open the main switch three seconds after but not start engine →more than 250 kPa Idle → 294±6kPa • Injector resistance specifications: 11.7±0.6Ω
		YES			
Ignition situation	• Removed the spark plug from the cylinder head, but then power lines still ring • Start the engine • check spark plug sparks	• Examine whether the spark plug ignition? • Check spark plug sparks strength is normal?	NO	• Spark plug fault • Roll over sensor fault • ECU fault • Ignition coil fault • Crankshaft position sensor fault	• Spark plug specifications: NGK-CR8E
		YES			

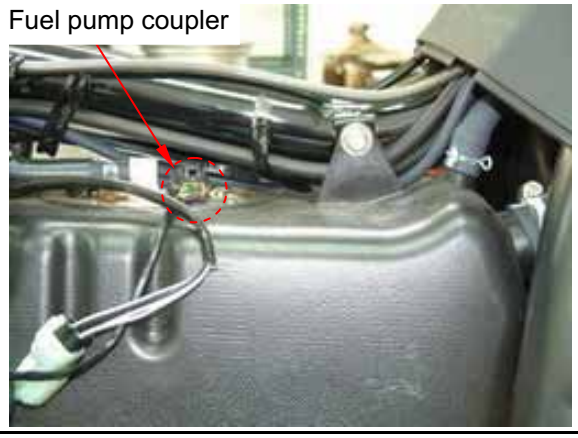
Continued next page


Continued from previous page
YES
Closed-loop systems for mobility
• Observation O_2 sensor voltage changes (Standed motorcycle so that engine speed refueling between 4500 to 5500 rpm
• O_2 sensor voltage is maintained in a long time within a certain range beating
NG
• O_2 sensor fault
• ECU fault
• O_2 sensor voltage beating specifications: 100 ~ 900 mV from the two groups within the interactive beating
YES
Engine vacuum
• Use diagnosis tool to detect of the manifold pressure
• Diagnosis tool manifold pressure for compliance with specifications?
NG
• Valve clearance is not normal
• Intake system leak
• Manifold pressure Specifications: 32~38 kPa
YES
Normal starting
Finish
Can not start or starting difficulties
In traditional engine overhaul way to maintenance

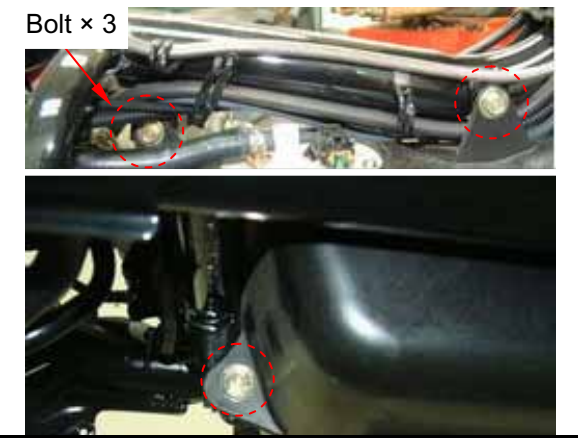
Remove fuel pump/fuel unit

Remove side cover.
Remove rear carrier
Remove rear bodycover.
Remove floor panel.
Remove under cover.
(refer to chapter 14)

Remove fuel pump lines coupler.
Release the fuel tube folder, removed the fuel tube.

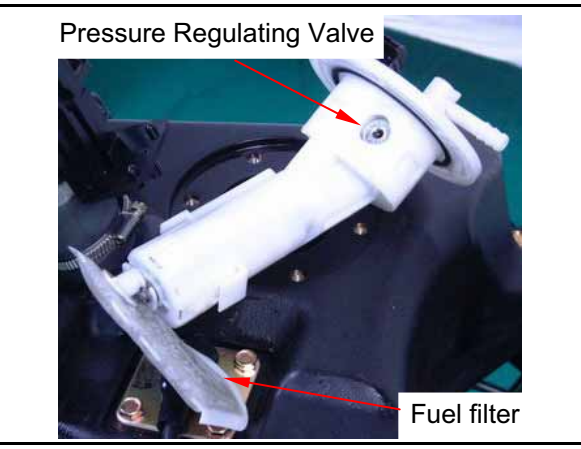


Remove the fuel tank fixed bolts (Bolt × 3), remove the fuel tank.



Remove / Install fuel pump and fuel unit

Remove fuel pump fixed bolts (Bolt × 6), remove fuel pump.
Install In the anti-demolition order.



⚠ Cautions

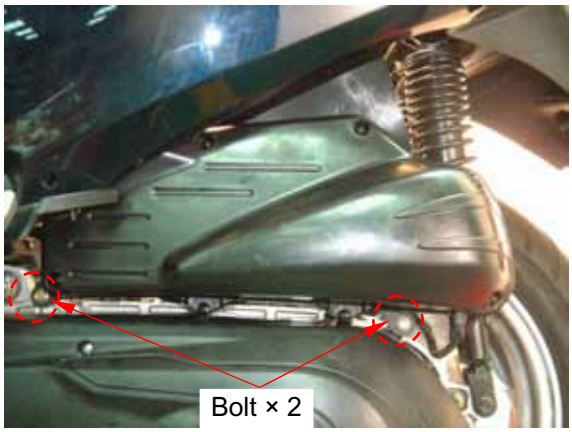
- Then remove fuel pump, fuel in fuel tank internal to confirm not excessive.
- Then install fuel pump and fuel unit, attention direction.
- Confirm whether the fuel filter dirt, obstructive.
- Fuel pump installation, to confirm whether it is normal to the fuel out (the pressure about 3 kg/cm2).

Air Cleaner

Remove

Remove left side body cover and luggage box.
Remove rear carrier and body cover.
Remove fuel gas recover tube.
Remove waste gas purification system pipes.
Remove TA Sensor coupler.

Remove intake tube fixed bolt (bolt×1).
Remove air cleaner fixed bolts (bolt×2).
Remove air cleaner.

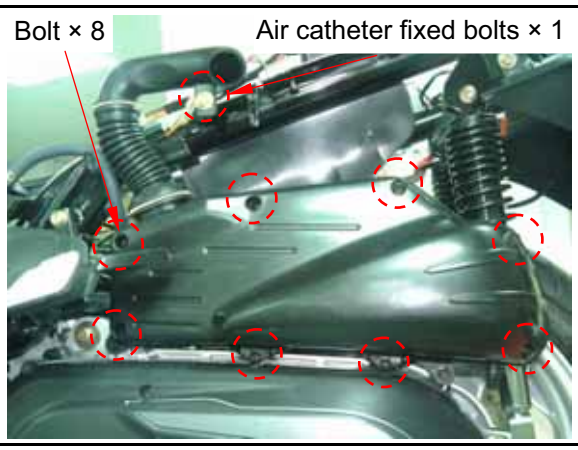


Install

Install In the anti-demolition order.

Clean air cleaner

Remove air cleaner cover (bolt×8).
Remove air cleaner filter (bolt×6).
Use compressed air to remove the adhesion of dirt, if not too much dirt cleared, please new replacement.

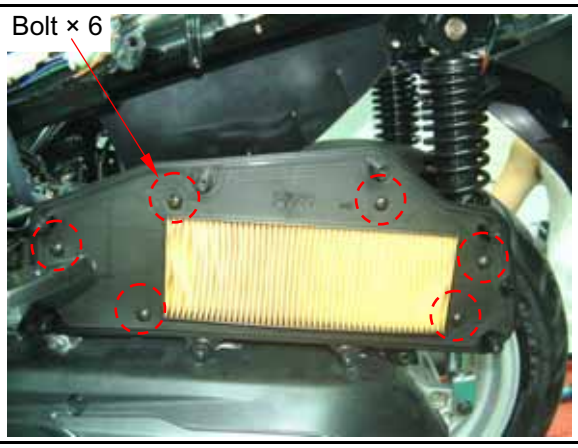


⚠ Cautions

- Air cleaner filter for paper products, must not soak or cleaning by water.

Install air cleaner

Install In the anti-demolition order.



⚠ Cautions

- Air cleaner filter and air filter cover should be covered formation is the installation, not to skew a seam, resulting dust, foreign body aspiration in the engine.

Fault Diagnosis Note

When the motorcycle injection system show the failure code, causing abnormal functioning of the engine or can not start engine, warning light at the meter will be lighting, to inform drivers to carry out maintenance.

Overhaul, the diagnosis tool can be used for troubleshooting (refer to diagnosis tool use guide), or manually by the meter warning light inspection revealed that the fault codes (refer to checking signal fault codes discriminant method), the two methods for maintenance.

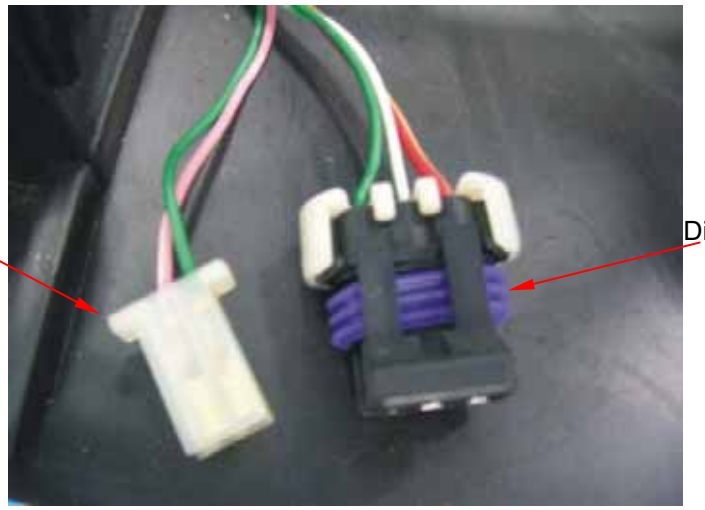
If the fault has been ruled out or repair after the inspection light will be extinguished, but ECU fault code will be recorded, so the need to get rid of fault codes. If a fault exists, this system has two kinds of methods to eliminate fault codes respectively in the diagnosis tool removal and manual removal.

Inspection by Diagnostic Scanner

Connect the diagnostic scanner to the motorcycle, proceed the inspection according to the use of diagnostic tool testing methods, when belong fuel injection system fault or parts fault, according to the diagnosis tool of the fault code display messages do describe parts of the inspection testing maintenance and replacement parts. When after the maintenance, the need to get rid of fault codes (Please refer to detailed steps diagnosis tool of instructions), or fault code will always be stored in the ECU.

Manual Inspection

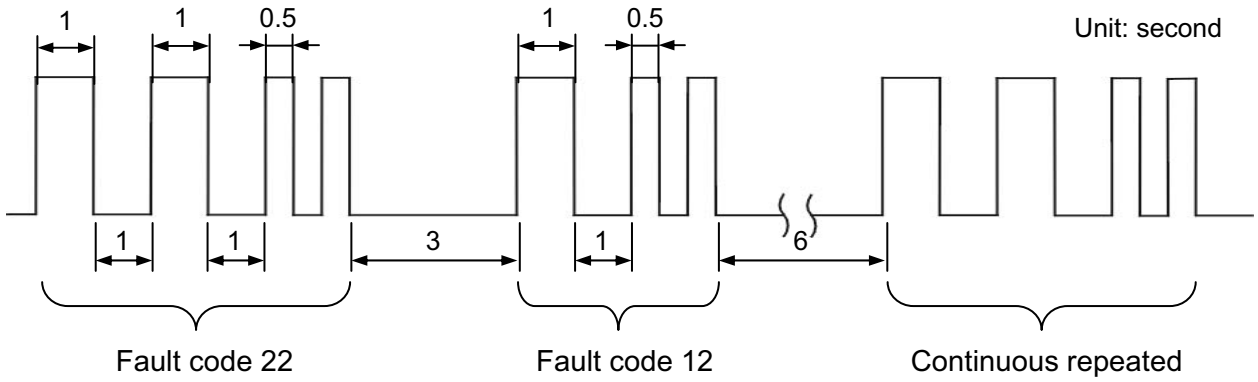
Use of cross-wiring (wire or paper clips, etc.) to cross-Joints Test Switch for grounding, in the meter of this check light are flashing, it means that the injection system or parts of abnormal situations, but not in the diagnosis tool can be - for the detection, inspection can enjoy for a long time flashing lights flashing and the short period of time to inform the cause of the malfunction (refer to check light fault information fault code table).



Check Light Fault Codes Differentiation

Check light flashing mode

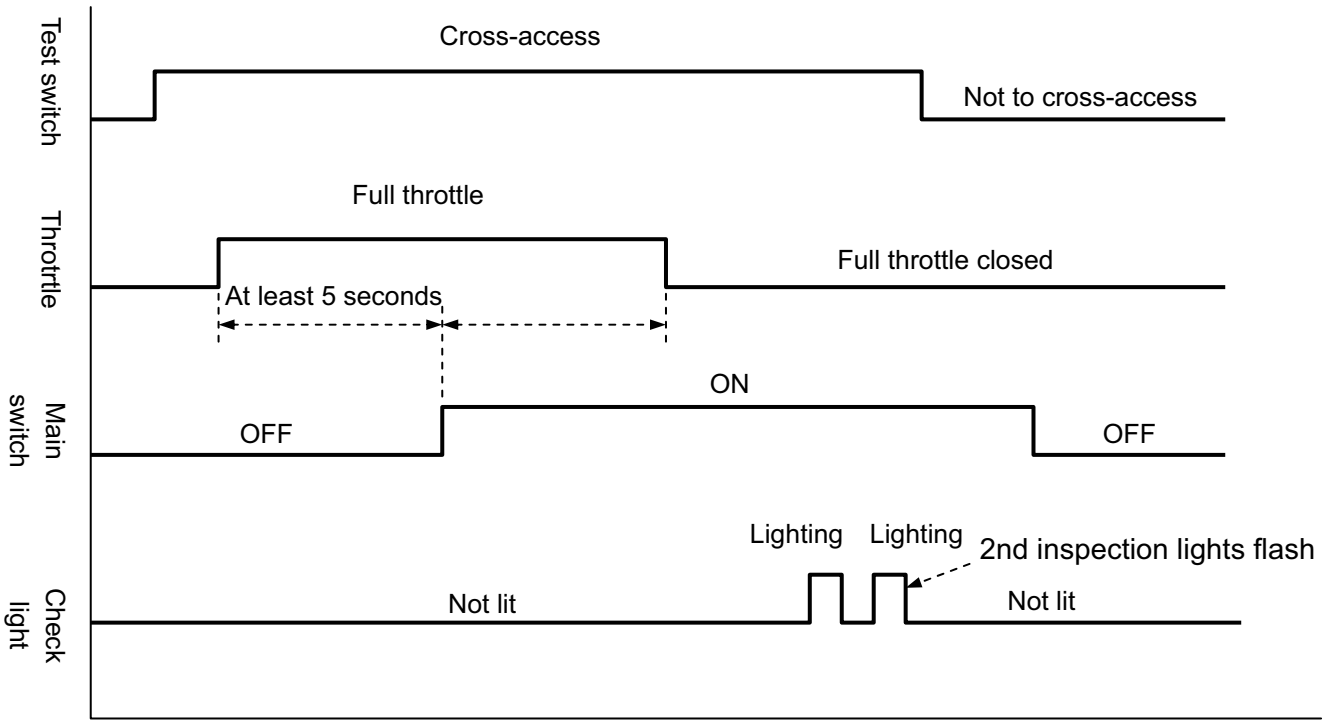
If problem without diagnosis tool to be detected, it can be cross-access the test switch coupler, the motorcycle from the CHK lights flashing signal interpretation, and then the basis for the diagnosis of dynamic information tables on the priorities of light, and prompts you to the motorcycle to the emergence of some warning, or FLASH CODE is to determine what kind of fault, and exclusion.



Fault Code manual removal procedure:

When there is without diagnosis tool, can be manually cleared Fault Code, the implementation of the following steps:

1. Main switch OFF
2. Cross-access the test switch for interconnection access, and without opening up (cross-access movement must indeed).
3. Full throttle and do not open up.
4. Main switch ON
5. Described above, the No. 3 with the No. 4 movements continued liberalization of 5 seconds later, about 5 seconds after inspections at carnivals "flash twice" to complete the removal of fault code.
6. Then remove the cross-wiring.



Fault Codes and Sensors Table

No.	Fault codes	Fault Description	Parts to be checked
1	0120	TPS Fault	Throttle position sensor and wire
2	0105	MAP Sensor Fault	MAP sensorand wire
3	0115	TW Sensor Fault (Coolant)	Engine temperature sensor and wire
4	0195	ET Sensor Fault (Cylinder Head)	Engine temperature sensor and wire
5	0110	TA Sensor Fault	Intake temperature sensor and wire
6	1630	ROS Fault	Roll over sensor and wire
7	0130	O_2 Sensor Fault	O_2 Sensorand wire
8	0201	Injector Fault	injector and wire
9	0351	Ignition Coil Fault	Ignition coil and wire
10	0230	Fuel Pump Fault	Fuel pump and wire
11	0135	O_2 Sensor Heater Fault	O2 Sensor and wire
12	1505	ISC Valve Stepper Motor Fault	Ster motor and wire
13	1410	AISV Fault	2^{nd} air control valve and wire
14	0335	CPS Fault	Crank position sensor and wire
15	1205	MAP Sensor Wire Fault	MAP Sensor Wire
16	0603	EEPROM fault	EEPROM

Fault Code and Warning Lamp Flashing Identification Table

No.	Fault codes	Fault Description	Check light	Check light flashing state	Parts Inspection
1	0120	Throttle position sensor fault	Lighting	long 0，short 6	Throttle position sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" throttle position sensor (TPS) chapter			
2	0105	Manifold Absolute Pressure sensor fault	lighting	long 0，short 9	MAP sensorand wire
		Fault detection procedures Please refer to the "EFI System components description" manifold Absolute Pressure sensor (MAP) chapter			
3	0115	Engine temperature sensor fault (water)	lighting	long 1，short 2	Engine temperature sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" engine temperature sensor (WPS) chapter.			
4	0195	Engine oil temperature sensor fault (oil)	lighting	long 1，short 1	Engine temperature sensor and wire
		The current reservation			
5	0110	Intake air temperature sensor fault	lighting	long 1，short 3	Intake temperature sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" intake temperature sensor (TAS) chapter.			
6	1630	Roll over sensor fault	lighting	long 1，short 5	Roll over sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" Roll over sensor chapter.			
7	0130	O_2 sensor fault	lighting	long 1，short 7	O_2 Sensorand wire
		Fault detection procedures Please refer to the "EFI System components description" O_2 sensor chapter.			
8	0201	I N J #1 fault	lighting	long 3，short 3	Injector and wire
		Fault detection procedures Please refer to the "EFI System components description" fuel injector chapter.			
9	0351	IG #1 fault	lighting	long 3，short 7	Ignition coil and wire
		Fault detection procedures to adhere to the traditional way			
10	0230	Fuel pump fault	lighting	long 4，short 1	Fuel pump and wire
		Fault detection procedures Please refer to the "EFI System components description" fuel pump chapter.			
11	0135	O_2 sensor heater fault	lighting	long 4，short 5	O_2 Sensorand wire
		Fault detection procedures Please refer to the "EFI System components description" O_2 Sensor chapter.			
12	1505	ISC motor fault	lighting	long 4，short 9	Stepper motor and wire
		Fault detection procedures Please refer to the "EFI System components description" idle speed control valve (ISC) chapter.			
13	1410	Exhaust 2^{nd} air solenoid valve fault	lighting	long 5，short 4	2^{nd} air control valve and wire
		Fault detection procedures Please refer to the "EFI System components description" 2^{nd} air solenoid valve chapter.			
14	0335	Crankshaft position sensor fault	lighting	long 6，short 6	Crankshaft position sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" Crankshaft position sensor chapter.			
15	1205	PM wire fault	lighting	long 6， short 8	Manifold absolute pressure sensor and wire
		Fault detection procedures Please refer to the "EFI System components description" Manifold absolute pressure sensor (MAP) chapter.			
16	0603	EEPROM fault	Not lit	long –，short –	EEPROM
		Replace ECU			

EFI Diagnostic Scanner - V70

Link cable

Soft cartridge

Note:

- When problems arise, can be used for diagnosis tool of the fault is detected, and exclusion.
- In addition to testing, troubleshooting, another of the operation can be carried out data analysis-type monitor.

Method of Use:

1. Maintain engine flameout state, do not open main switch.
2. Opened the luggage box lighting light cover (screw x2), connected to the diagnostic connector for diagnosis tool.
3. Then open the main switch and the diagnosis tool power switch after diagnosis display screen appeared the words connection.
4. Press the "ENTER" button into the main screen (there are 6 major functions: ECU ID, DATA STREAM, FREEZED DATA, TROUBLE CODE, ERASE TB CODE and CO ADAPTION)
5. Use ▲, ▼ select button under the function, press the "ENTER" button access into various functions.
   Example: select "DATA STREAM," by the "ENTER" button, the screen showed that the existing fault codes; indicates no fault "system is OK."
6. Press "EXIT" buttom to leave of the various functions.
7. Must to close the main switch or power switch of the diagnosis tool after, and then can removal of diagnosis tool coupler.

Diagnostic Scanner Use Note

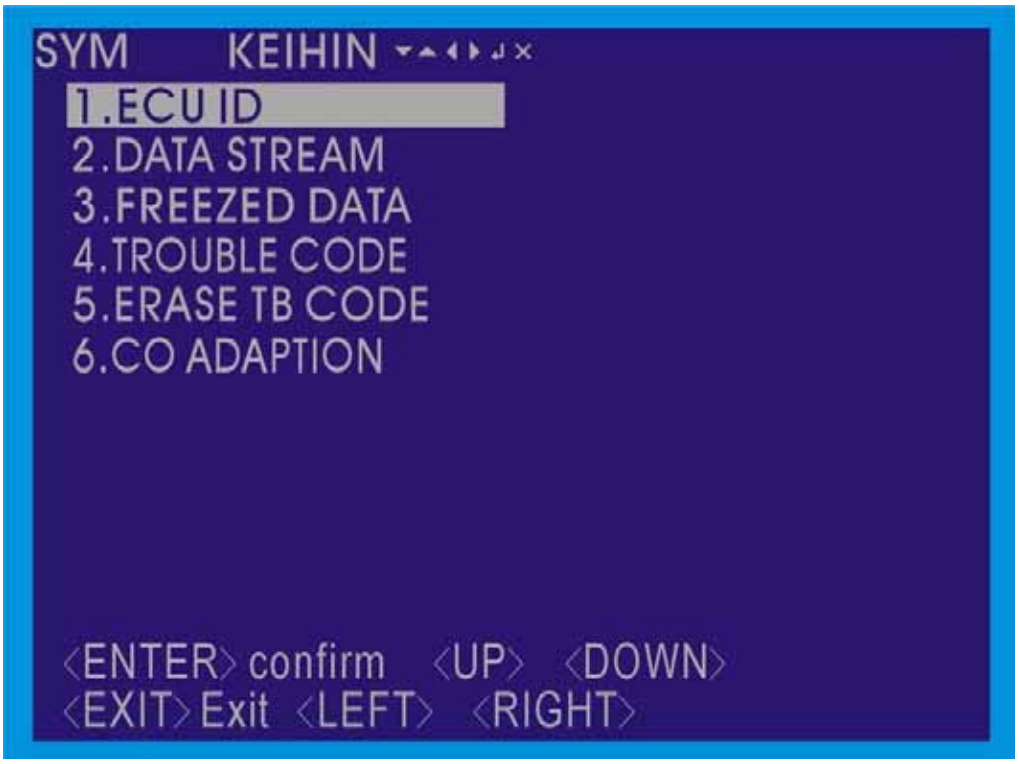
Diagnosis of connectivity

1. For the diagnosis tool coupler access to the motorcycle injection system diagnostic signal coupler.
2. main switch ON.
3. Open the diagnosis left power switch, which turn on the LCD screen, the screen brightness adjustment knob to the appropriate brightness.
4. SYM and cartridge content display on screen (such as icon), by the beginning of the implementation of any button.
5. Display diagnostic software release; press the "ENTER" buttom to the implementation.

Options main functional areas:

1. ECU ID
2. DATA STREAM
3. FREEZED DATA
4. TROUBLE CODE
5. ERASE TB CODE
6. CO ADAPTION

Use "▲" "▼" button, select mobile anti-white subtitles implementation of the project, and then press the "ENTER" key to the implementation.



4. Fuel Injection System

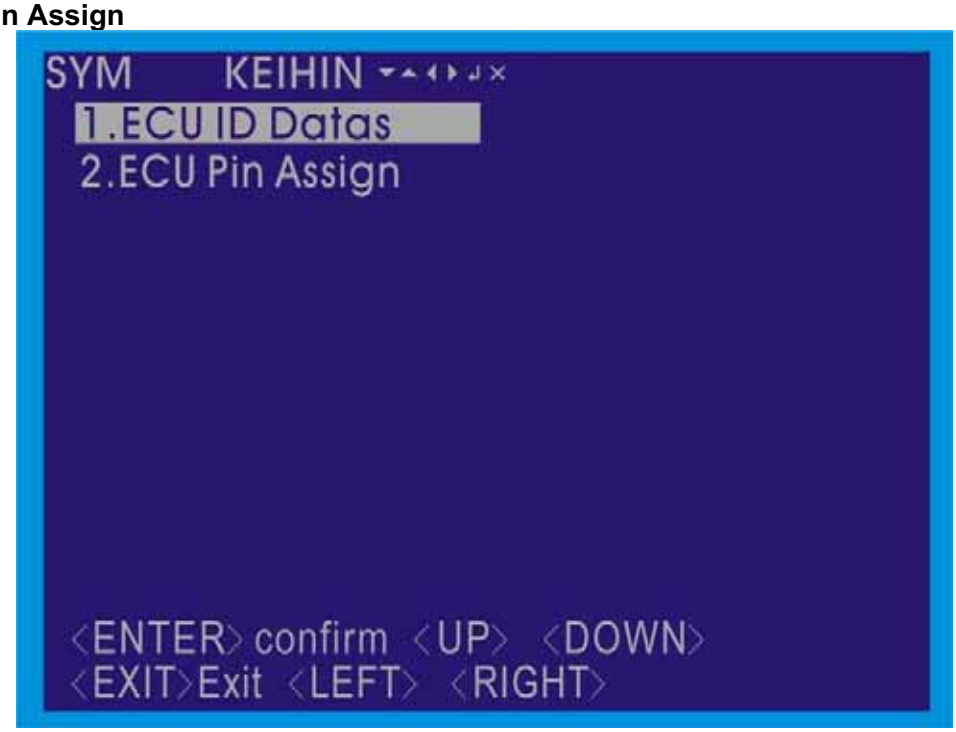
1. ECU ID

In the directory functions used "▲" "▼" button, select ECU ID project, press the "ENTER" buttom to the implementation of information systems function.

ECU ID containing two functions:

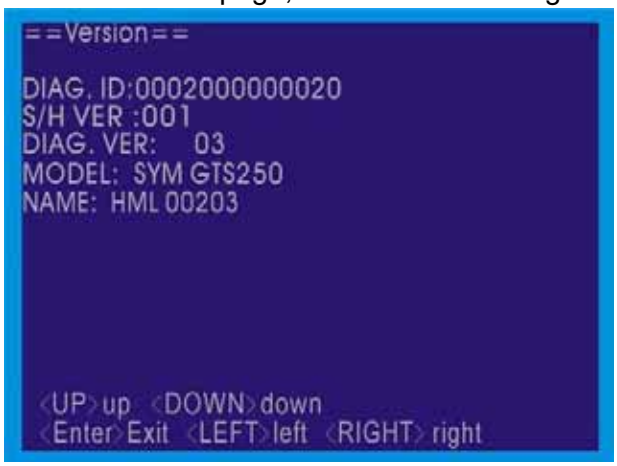
1-1. ECU ID Datas

1-2. ECU Pin Assign



1-1. ECU ID Datas

Use "▲" "▼" button, select ECU ID projects, press the "ENTER" buttom to the implementation.
A total of 2 page, use "◄ left" and "right ►" button, view ECU information.



DIAG. ID: 0002000000020 (Diagnosis tool ID)
S/H VER: 001 (Software Version)
DIAG. VER: 03 (Diagnosis Version)
MODEL: SYM GTS250
NAME: HML 00203

H/W VER: (Hardware version)
S/H VER: 001 (Software Version)
CALI ID: (Correction ID Code)
ECU NO: 001

1-2. ECU Pin Assign

Use "▲" "▼" button, select the ECU pin project, press the "ENTER" buttom to the implementation of the ECU pin functions.

ECU pin assign total of 5 pages that can be used "◄ left" and "right ►" button, view the page note.

Page 1:
1: IGP [R/Y] B+
2:
3: CRK-P [G/W] Crankshaft pos. Sensor-
4:
5: TH [W/Br] Throttle angle [A/D]
6: PM [B/R] Manifold Press. SNSR I/P [A/D]
7: HEGO [Pink/B] O2 sensor [A/D]
8: LG [G] shild GND

Page 2:
9: CRK-M [L/Y] Crankshaft pos. Sensor+
10: K-LINE [W/G] K-Line
11: FLPR [O/W] Fuel pump relay O/P
12: SOL [O/L] 2nd air (RV250)
13: VCC [Y/B] Sensor V+ (DC 5V)
14: ISCBP [G/B] Step MTR B+ (RV250)
15: ISCAP [L/B] Step MTR A+ (RV250)
16: INJ [L/G] Injection O/P

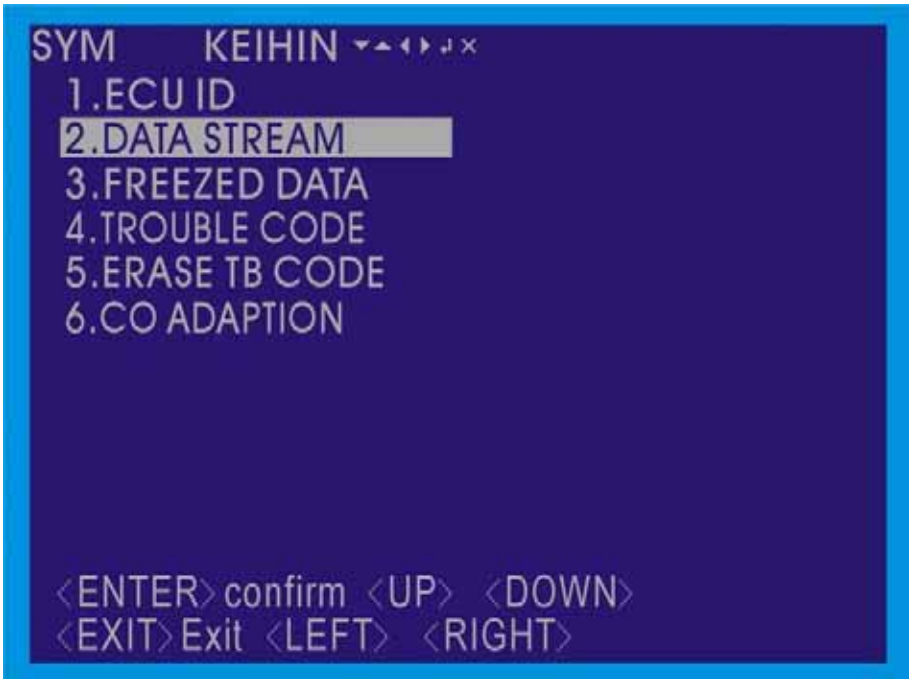
Page 3:
17: HEGOHT [R/O] O2 Sensor heater
18: IG [B/Y] Ignition O/P
19: BAT [R] Battery B+ (RV250)
20: TRIG [Pink] Test sw
21: MIL [Y/G] MIL O/P
22: TE [R/Gr] Eng. Temp. Sensor (A/D)
23:
24: SG [G/R] Sensor (A/D) GND

Page 4:
25: TA [G/Br] IAT Sensor (RV250)
26:
27:
28:
29:
30:
31: ISCAN [Br/B] Step MTR A- (RV250)
32: ISCBN [B/W] Step MTR B- (RV250)

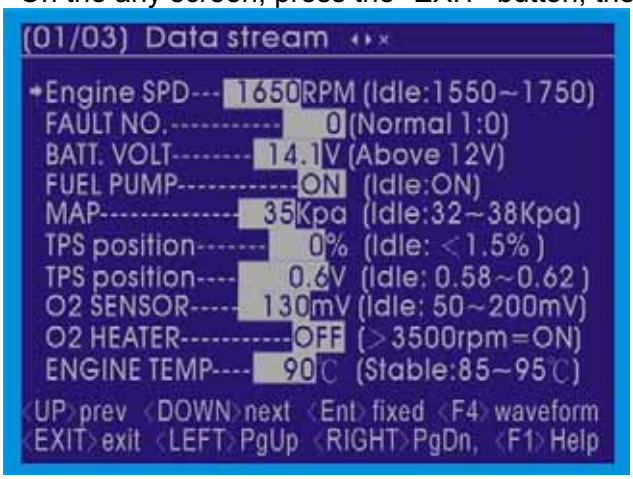
Page 5:
33:
34:
35: PG1 [G] System GND
36: PG [G] System GND

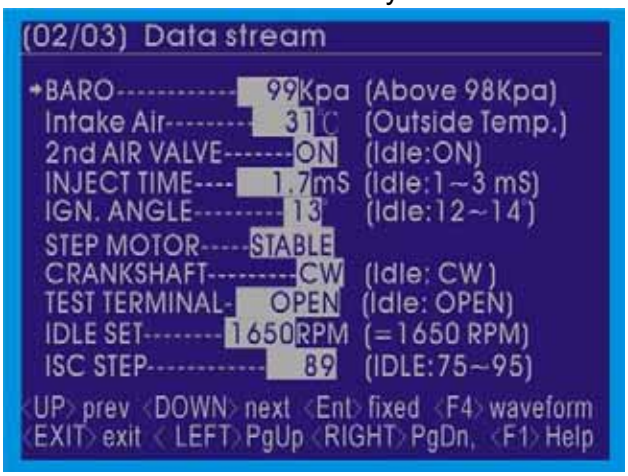
2. DATA STREAM

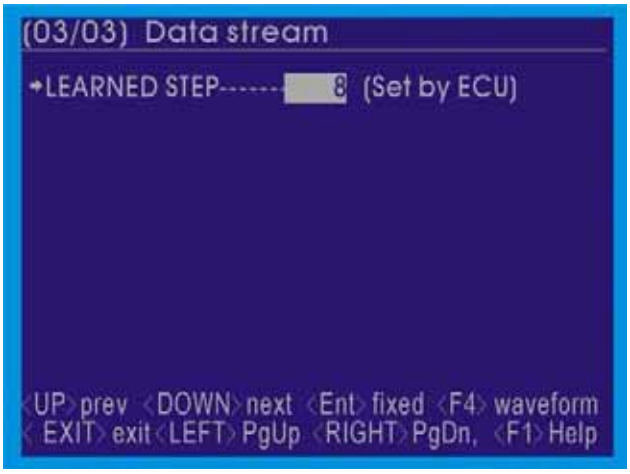
In the directory functions used "▲" "▼" button, select "DATA STREAM" project, press the "ENTER" key to the implementation.



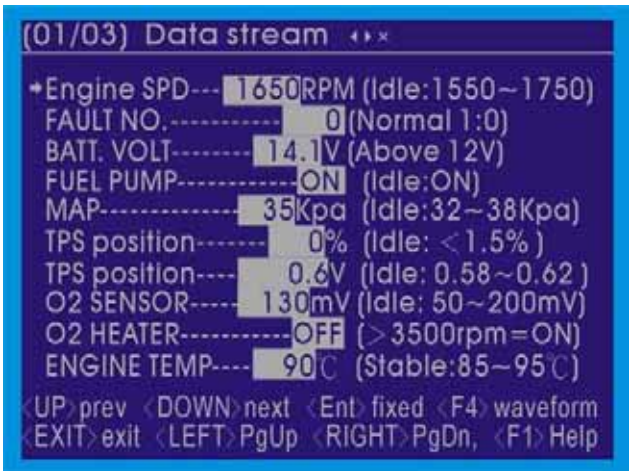
A total of 3 pages, are able to use "◄ left" and "right ►" button, view injection system information. On the any screen, press the "EXIT" button, the function can return to the directory screen.







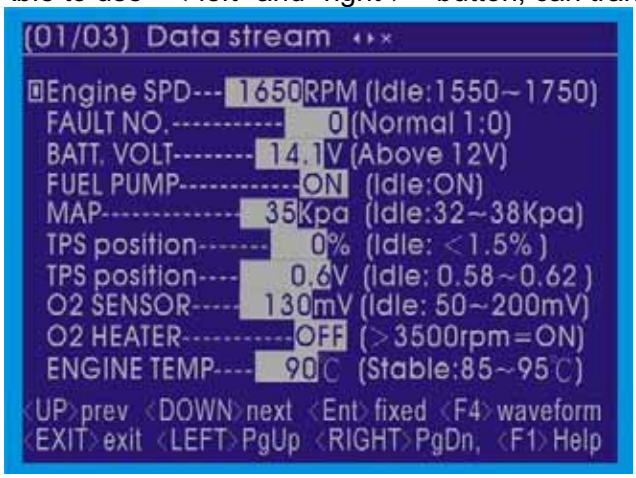
Data stream (1/3)

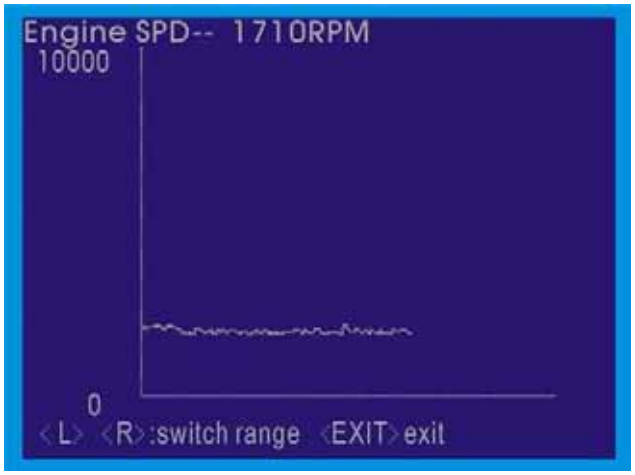


The screen showed the ECU captured by the engine of the state immediately.
The following data for the benchmark idling state:

- Engie SPD--- RPM (Idle:1550~1750) →Engine idle speed
- FAULT NO.-------- (Normal:0) →Fault code number
- BATT. VOLT---- V (Above 12V) →Battery voltage
- FUEL PUMP---------- (Idle:ON) →Fuel pump actuator state
- MAP---------- kPa (Idle:32~38kPa) →Manifold pressure
- TPS position------ % (Idle:< 1.5%) →Throttle opening
- TPS position---- V (Idle:0.58~0.62) →Throttle sensor voltage
- O_2 SENSOR---- mV (Idle:50~200mV) →O_2 sensor voltage
- O_2 HEATER--------- (Idle:> 3500rpm=ON) →O_2 heater actuator state
- ENGINE TEMP-- ºC (Stable:85~95ºC) →Engine temperature (cooling water temperature)

In the "DATA STREAM" of the screen use "▲" "▼" button to move the left side of the project "→" symbol selected items, press the "ENTER" buttom lock of the project, and press the "F4" button showed that the wave of projects.
Able to use "◄ left" and "right ►" button, can transform View wave numerical size.





Numerical analysis of images (1 / 3), the waveform can be displayed as shown in the following items:

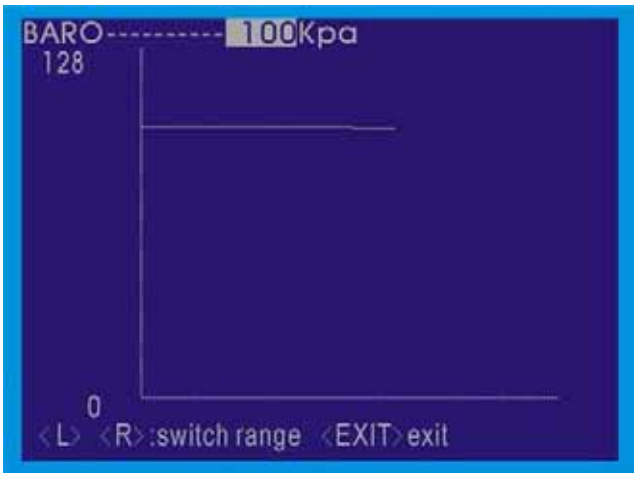
- Engie SPD
- BATT. VOLT
- MAP
- TPS position %
- TPS position Voltage
- O_2 SENSOR Voltage
- ENGINE TEMP

Data stream (2/3)

The screen showed the ECU captured by the engine of the state immediately.
The following data for the benchmark idling state:

- BARO---------- kPa (Above 98kPa) →Atmospheric pressure
- Intake Air---------- ºC (Outside Temp.) →Intake air temperature
- 2nd AIR VALVE------ V (Idle:ON) →Secondary air solenoid valve actuator state
- INJECT TIME---- mS(Idle:1~3mS) →Injection time
- IGN. ANGLE---------- (Idle:12~14) →Ignition timing
- STEP MOTOR ------ →Idle air control valve step motor actuator state
- CRANKSHAFT ---------- (Idle:CW) →Crankshaft functioning direction
- TEST TERMINAL-- (Idle:OPEN) →Test terminal state
- IDLE SET---------- RPM (=1650 RPM) →Idle speed goal set value
- ISC STEP---------- (Idle:75~95) →Idle Air Control Valve stepper motor learning step

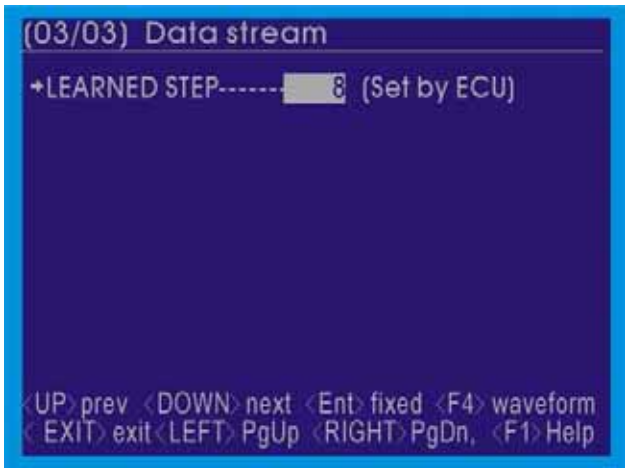
In the "DATA STREAM" of the screen use "▲" "▼" button to move the left side of the project "→" symbol selected items, press the "ENTER" buttom lock of the project, and press the "F4" button showed that the wave of projects.
Able to use "◄ left" and "right ►" button, can transform View wave numerical size.



Numerical analysis of images (2 / 3), the waveform can be displayed as shown in the following items:

- BARO
- Intaje Air
- INJECT TIME
- IGN. ANGLE
- IDLE SET
- ISC STEP

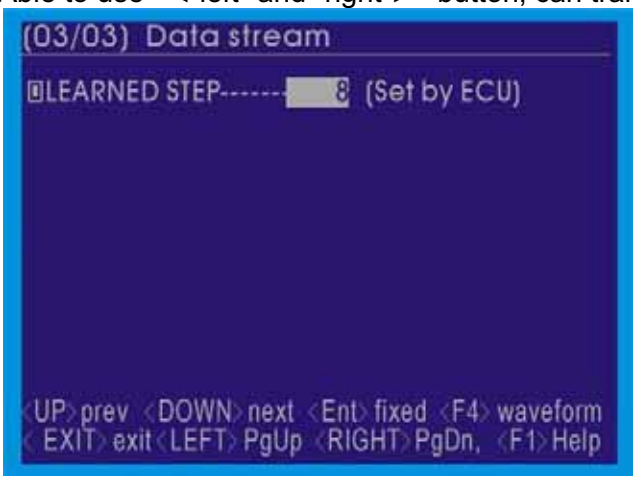
Data stream (3/3)



The screen showed the ECU captured by the engine of the state immediately.
The following data for the benchmark idling state:

- LEARNED STEP---------- (Set by ECU) →Idle Air Control Valve stepper motor learning step

In the "DATA STREAM" of the screen use "▲" "▼" button to move the left side of the project "→" symbol selected items, press the "ENTER" buttom lock of the project, and press the "F4" button showed that the wave of projects.
Able to use "◄ left" and "right ►" button, can transform View wave numerical size.



Numerical analysis of images (3 / 3), the waveform can be displayed as shown in the following items:

- LEARNED STEP NO.

3. FREEZED DATA

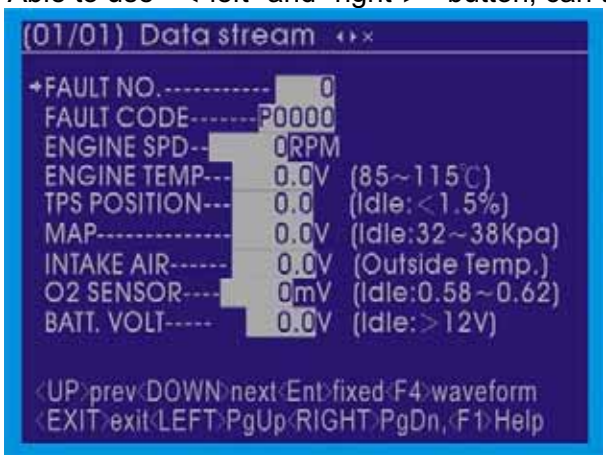
Objective: When a sensor fault, the EMS system will record all the parameters of fault signals, in order to facilitate fault diagnosis.

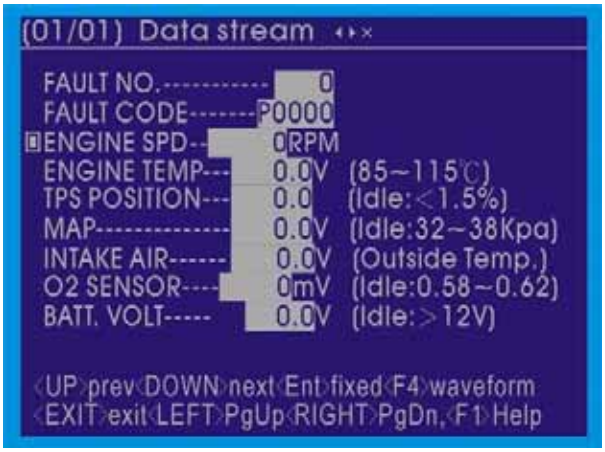
In the directory functions used "▲" "▼" button, select "FREEZED DATA" project, press the "ENTER" key to the implementation.

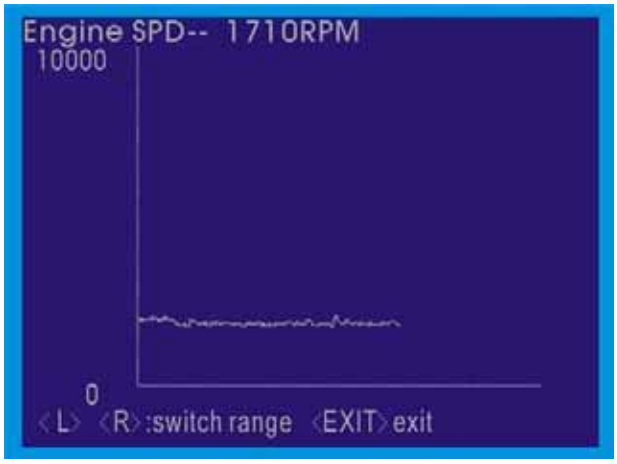
Only one page, at any screen, press the "EXIT" button, the function can return to the directory screen.

In the "FREEZED DATA" of the screen use "▲" "▼" button to move the left side of the project "→" symbol selected items, press the "ENTER" buttom lock of the project, and press the "F4" button showed that the wave of projects.

Able to use "◄ left" and "right ►" button, can transform View wave numerical size.







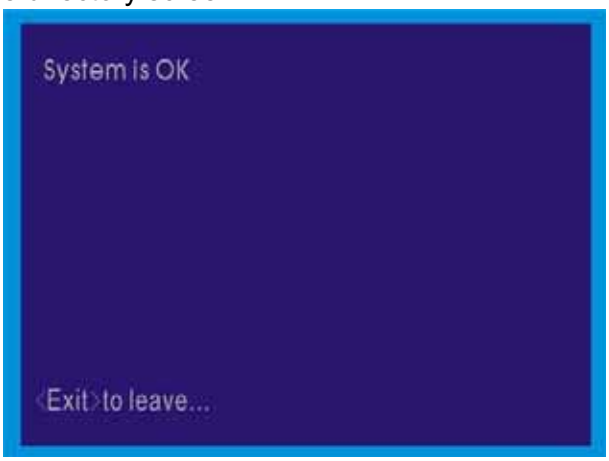
4. TROUBLE CODE

In the functional directory select "TROUBLE CODE" project, press the "ENTER" button implementation, the message began to read fault.

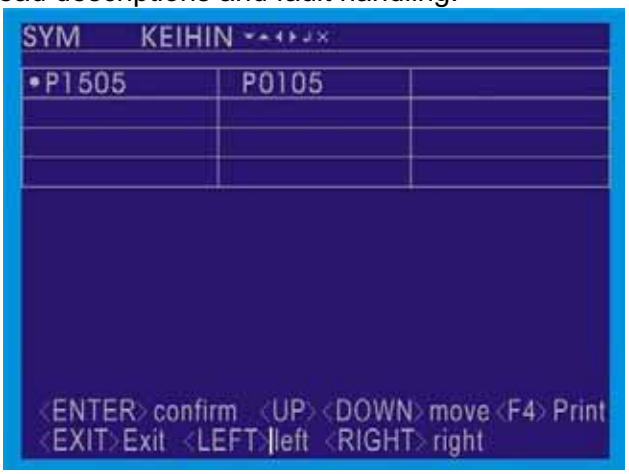
Fault Code: electronic injection system that had happened fault of the message (whether or not completion of repair).

Without any fault is that showing "System is OK".

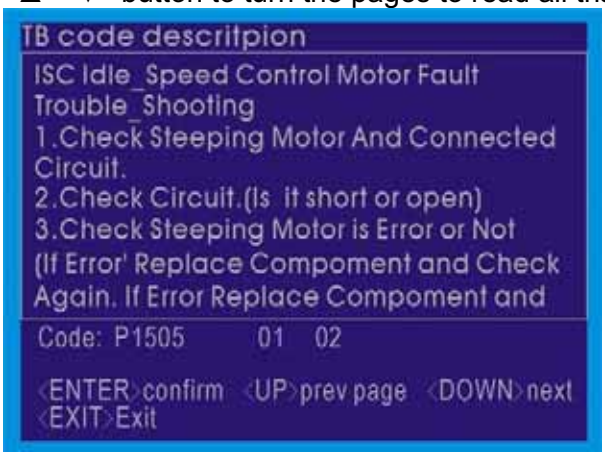
Press the "EXIT" button, the function can return to the directory screen.

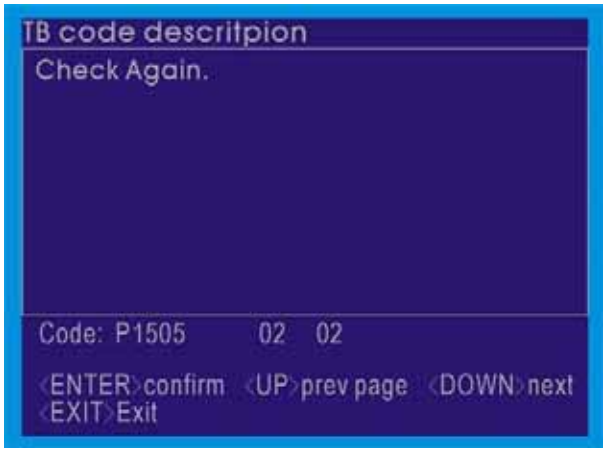


If the system has faulty code, that is showing the fault code, that can be used "◄ left" and "right ►" or "▲" "▼" button selected the fault code (selected before the code "•" tags) that, press the "ENTER" button, the code can be read descriptions and fault handling.



Fault code in the note and treatment of the pages, if the first one page did End, they can press the "▲" "▼" button to turn the pages to read all that.

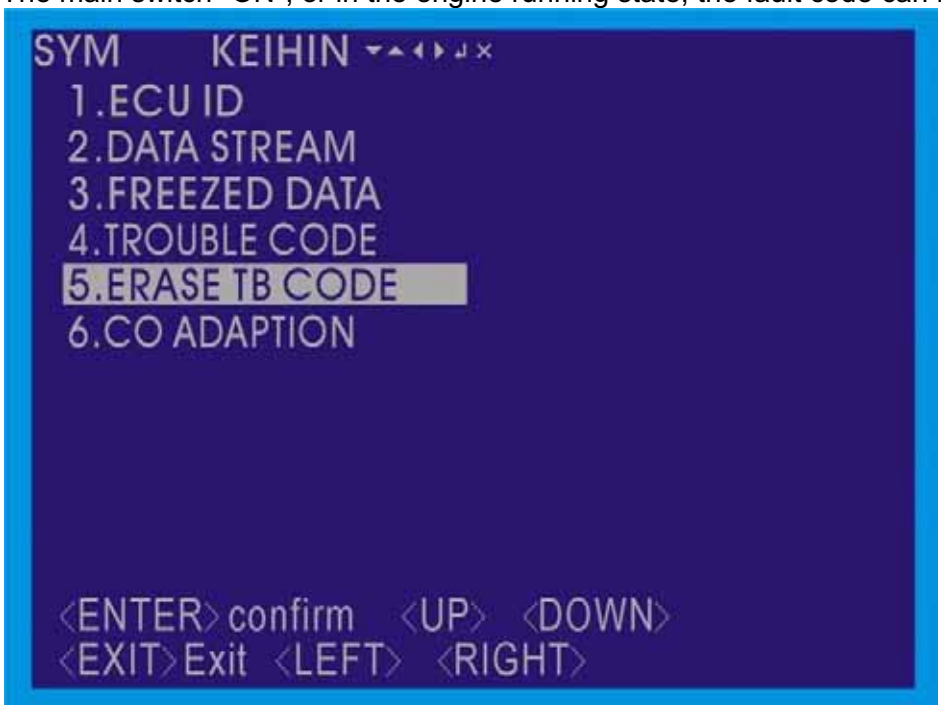

TB code descritpion
ISC Idle_Speed Control Motor Fault
Trouble_Shooting
1.Check Steeping Motor And Connected Circuit.
2.Check Circuit.(Is it short or open)
3.Check Steeping Motor is Error or Not
(If Error' Replace Compoment and Check
Again. If Error Replace Compoment and
Code: P1505 01 02
〈ENTER〉confirm 〈UP〉prev page 〈DOWN〉next
〈EXIT〉Exit



5. ERASE TB CODE

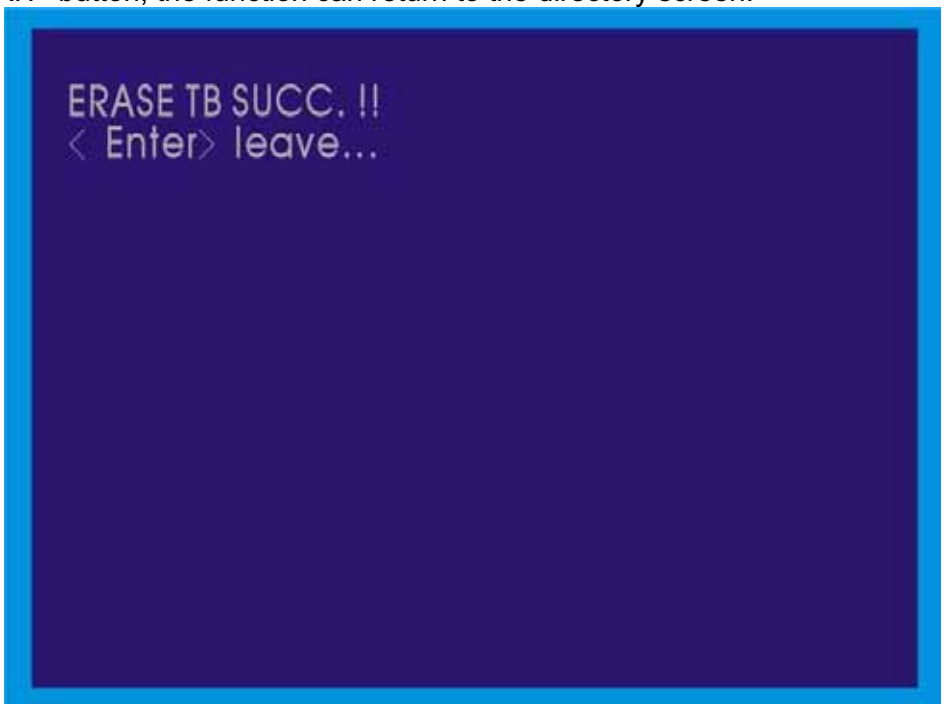
In the directory functions used "▲" "▼" button, select "ERASE TB CODE" project, press the "ENTER" key to the implementation.

Conditions: The main switch "ON", or in the engine running state, the fault code can be removed.



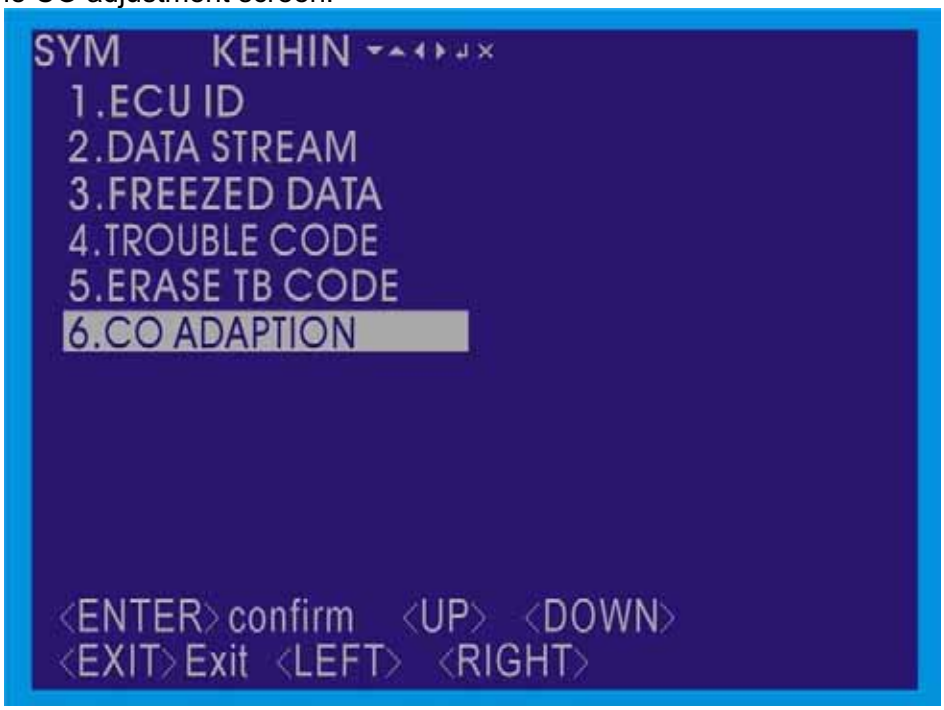
Fault code removed, namely showing the "ERASE TB SUCC.!".

Press the "EXIT" button, the function can return to the directory screen.

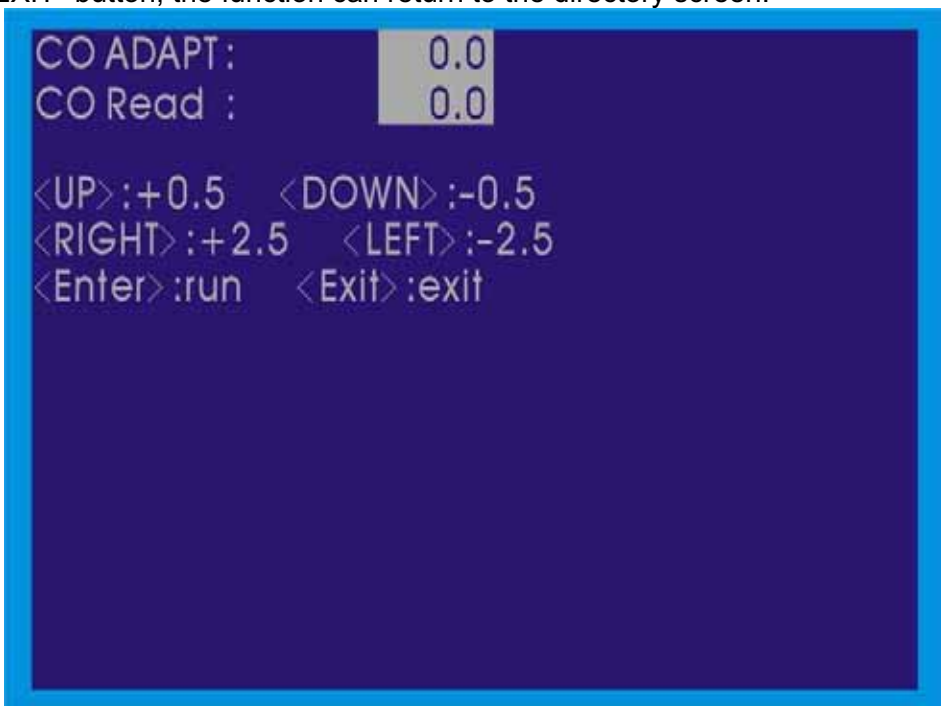


6. CO ADAPTION

In the directory functions used "▲" "▼" button, select "CO ADAPTION" project, press the "ENTER" buttom into the CO adjustment screen.



Use "◄ left" and "right ►" or "▲" "▼" button, CO value can be adjusted.
CO ADAPT: CO adjusted value.
CO Read: CO read-back value.
Press the "EXIT" button, the function can return to the directory screen.



4. Fuel Injection System

Troubleshooting Table

Test items / Abnormal phenomena		Comprehensive testing program							Parts		
		Power voltage	Fuel press.	Ignition state	Engine vacuum	Injection state	closed-loop control system	Fault Code Detection	ECU	Throttle position sensor	Engine temp. sensor
Start state	Can't start	O	O	O	O	O		O	O		
	Difficult to start	O	O		O			O		O	O
Idle state	Without idle			O	O	O		O		O	O
	Idle not smooth					O	O	O	O	O˘	
	RPM NG							O	O		
	CO NG		O			O	O	O	O		
Acceler-ation	Not smooth		O	O	O	O		O	O	O	O
	Inability and slow		O	O	O	O		O	O	O	O
Flameo-ut	Idle flameout				O			O			
	Acceleration flameout							O	O		

Related spare parts							
	Roll over sensor	Fuel pump	Ignition coil	Inlet pipe	Injector	O2 sensor	
	Power relay	Fuel pressure adjustment valve	Spark plug	Cylinder head	Fuel pump	Secondary air injection solenoid valve	
	Security unit	Fuel pump relay		Inlet pressure sensor	Fuel pressure adjustment valve		
	Main switch	Fuel filter					
	Battery						

Notes: 1. Integrated test motorcycle, according to the "Comprehensive Maintenance list" implementation.
2. Spare parts, according to the "EFI System components description" implementation.

Comprehensive Maintenance List

No.	Maintenance Project	Testing Procedures	Test items	Determine benchmarks	Fault reasons
1	**Power and voltage**	• Use meter direct measurement battery voltage • Use diagnosis tool detection of battery voltage	• Battery voltage	• Battery voltage = 10V Above	• Battery electricity • Battery connector loose • Harness circuit opening • ECU coupler not connected properly
2	**Fuel pressure**	• Use fuel pressure gauge, connected in series between the injector and the Pressure Regulating Valve • Main switch ON, but not start engine • Check fuel pressure • Start engine (idle) • Check change of the fuel pressure • throttle several rotation • check to the change of fuel pressure again	• Open the main switch, but not to start the engine of pressure • Pressure in idle • Rotating throttle, situation of pressure changes	• Open main switch, but not srart: pressure = 250kPa (Stable value) • Idle state: pressure = 294±6kPa (Beating situation from top to bottom) • rotation throttle moment: pressure = 294±6kPa (Slightly beating)	• Fuel not enough • Security switch not disarm • Ruel pump relay fault • Ruel pump fault • Injector fault • ECU fault
3	**Ignition state**	• The spark plug removed from the cylinder head, but the power lines still ring • Start engines or use for the diagnosis tool of output View spark plug ignition conditions	• Spark plug specifications • Whether the spark plug ignition • Spark plug sparks whether it is normal strength	• Specifications: NGK-CR8H • Ignition conditions: With traditional engines found ways	• Spark plug fault • Roll over sensor fault • ECU No. 5 pin fault • Ignition coil fault • Crankshaft position sensor fault
4	**Engine vacuum**	• Diagnosis tool to detect the use of	• Manifold pressure of diagnosis tool	• Manifold pressure =32~38kPa	• Valve clearance abnormal • Intake system leak
5	**Injection state**	• The injector removed from the throttle body, but not dismantle pipeline • Main switch ON, but not start engine • Investigation the injector it's leaking fuel? • Once again start engines or use for the diagnosis tool of output function • Check injector fuel injection and the injection situation	• Open the main switch, but did not start engine the injection situation • Injector state when start	• Not started, injector not leaking fuel • In started, the injection state must show fan shape	• Security unit is configured not disarm • Fuel pump relay fault • Fuel pump fault • Injector fault • ECU fault
6	**Closed - loop control system**	• Use of diagnostic tool observation O2 Sensor voltage changes	• Stable condition, sensor voltage variation (Idle continued 5 minutes later to measurement)	• Idle stable condition: O2 Sensor voltage = 50 ~ 200mV (Show from top to bottom beating phenomenon)	• O2 Sensor fault • ECU fault
7	**Fault Code Detection**	• Use of the diagnosis tool existing fault-detection code or historical Fault Code • Elimination of the implementation of fault codes, check can be eliminated • Once again start engine • Check fault is it happen again	• Diagnosis tool of the fault code is it can be eliminated • Start again, the fault is it will happen again	• Without any residual Fault Code • If residual Fault Code, according to the "Fault Code Maintenance Form" implementation of troubleshooting	• throttle position sensor fault • Engine temperature sensor fault • Intake temperature sensor fault • Manifold pressure sensor fault • O2 Sensor fault • Crankshaft position sensor fault • ECU fault • Roll over sensor fault

Notes: 1.Fuel pressure gauge connected between the fuel tank and injector, open the main switch to repeatedly shut down, fuel system makes pressure stability.
2.Injector and injector cap tightly by hands, fuel spills should not be the case.

Note:

Operational Precautions ····· 5-1	Rear Fork ····· 5-8
Engine Removal ····· 5-2	Removal of Engine Mount Bushing···· 5-10
Engine Hanger ····· 5-7	Installation of Engine ····· 5-11

Operational Precautions

General Information

- Engine must be supported by a bracket or adjustable tool in height.
- The following parts can be serviced with the engine installed on the frame.
  1. Carburetor.
  2. Driving disk, driving belt, clutch, and transporting disk.
  3. Final reduction gear mechanism.
  4. AC. Generator.

Specification

Item		LH30W
Engine Oil Capacity	Replacement	1,200 c.c.
	Disassemble	1,400 c.c.
Gear Oil Capacity	Replacement	170 c.c.
	Disassemble	180 c.c.
Capacity of coolant	Engine + radiator	1400 c.c.
	Reservoir upper	1200 c.c.

Torque Values

Engine hanger bolt (frame side)	7.5~9.5kgf-m
Engine hanger nut (engine side)	7.5~9.5kgf-m
Bolt of rear cushion upper connection	3.5~4.5kgf-m
Bolt of rear cushion lower connection	2.4~3.0kgf-m
Rear wheel axle nut	11.0~13.0kgf-m

Engine Removal

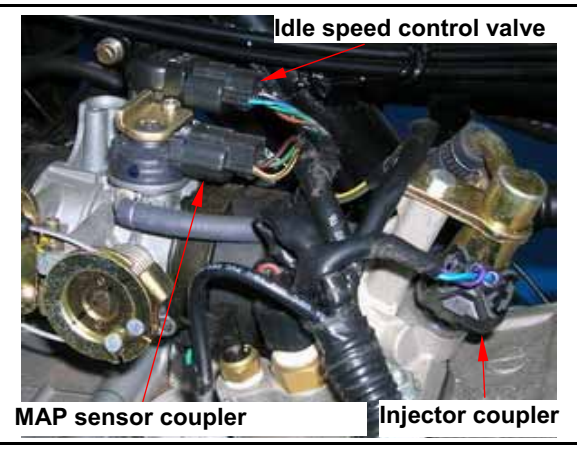
Open the seat.
Remove battery cover (3 screw).
Remove the battery negative (-) cable.
Remove the battery positive (+) cable.

Open the seat.
Remove the luggage box (6 bolts).
(Refer to chapter 13)

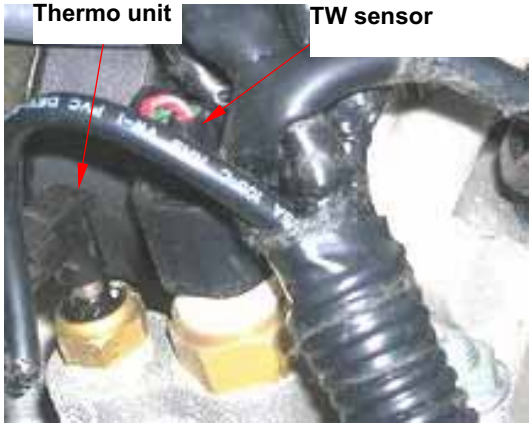
Remove right and left side covers (4 screws on each side.)
Remove rear center cover(1 screw).
Remove rear carrier (4 bolts).
Remove right and left side garnish(1 screw).
Remove body cover (4 screws & 1 coupler & 2 bolts).
Remove floor panel(4 bolts).
(Refer to chapter 13)

Remove fuel injection system of electrical couplers and fuel hoes

Remove idle speed control valve, MAP sensor, injector couplers.

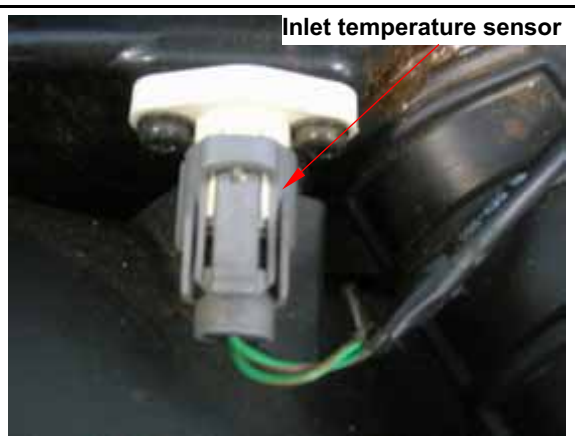


Remove the thermo unit and TW sensor wire couplers.

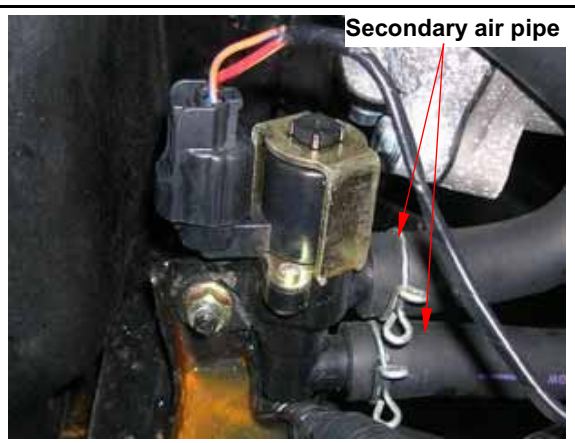


Remove the throttle position sensor coupler.

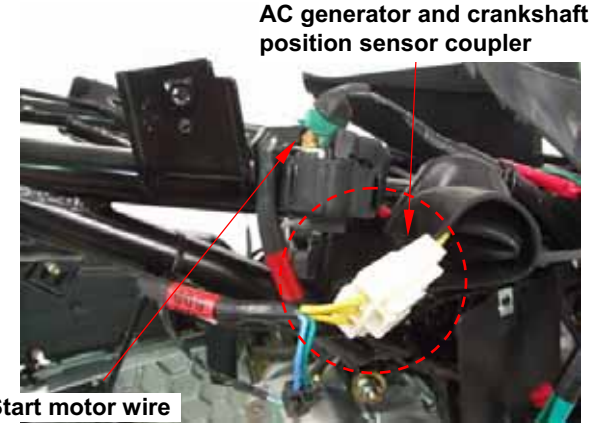
Remove the TA sensor coupler.



Remove the AISV pipe.



Remove AC generator and crankshaft position sensor coupler.
Remove the start motor wire from the start relay.



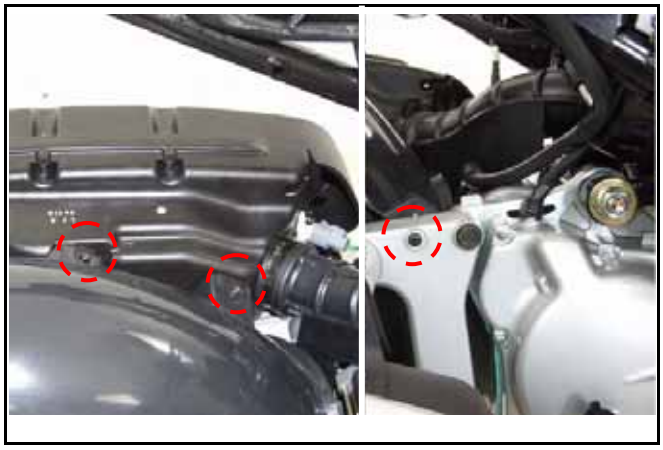
Remove O_2 sensor wire coupler.

Start engine for the pipeline to be exhausted within the residual pressure, the engine flameout, relaxing fuel tube folder, open for fuel tube.

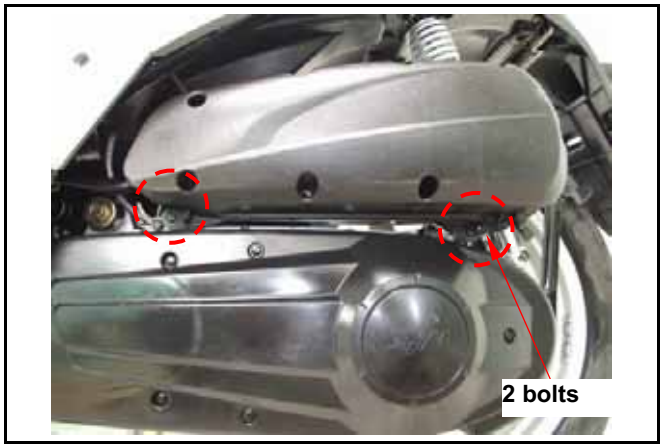
⚠ Caution

- Demolition for the pipeline will be required for residual pressure in the pipeline to divest, or use the folder surrounds the tubing to prevent petrol splash.

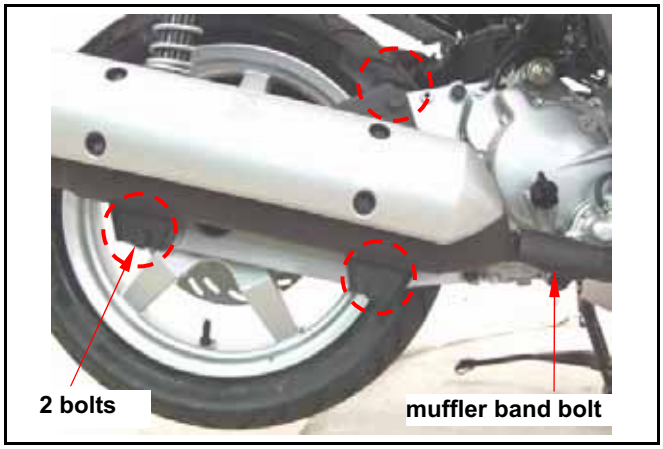
Loosen 3 screws from rear mudguard.



Remove the air cleaner connection bolts (2 bolts).
Remove the air cleaner.

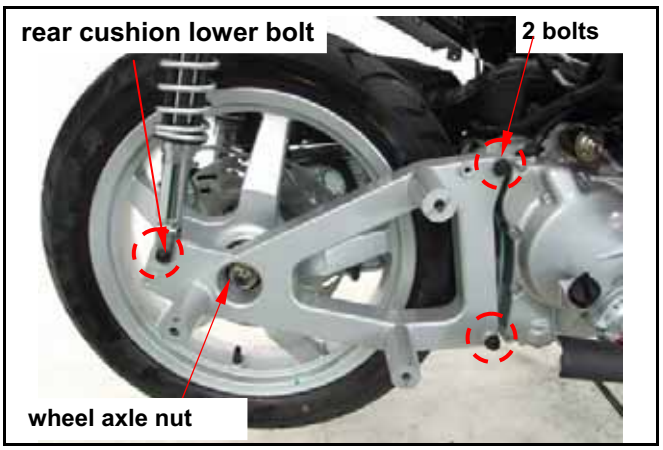


Loosen the 3 bolts from muffler.
Loosen the muffler band bolt (1 bolt).
Remove the muffler.



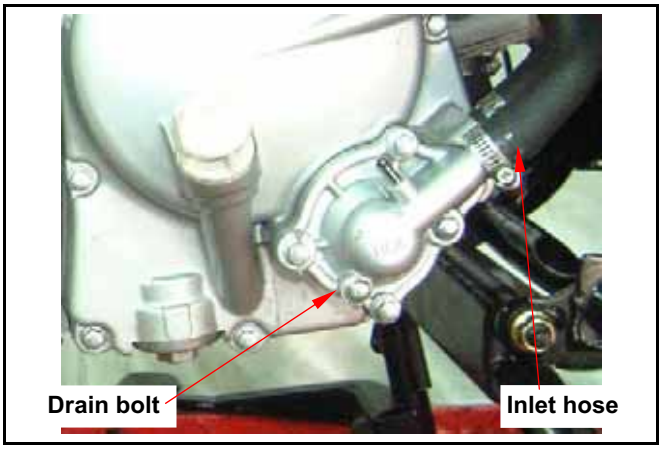
5. Removal & Installation of Engine

Remove the right rear cushion lower bolt (1 bolt).
Remove the rear fork bolts (2 bolts).
Remove the rear wheel axle nut (1 nut).

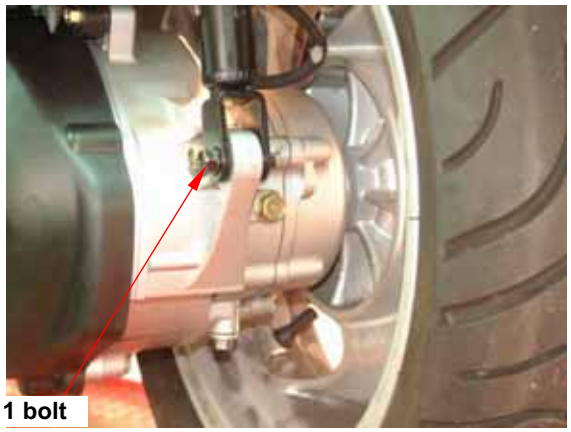


Remove rear brake hose clamp and rear brake caliper.(2 bolts)

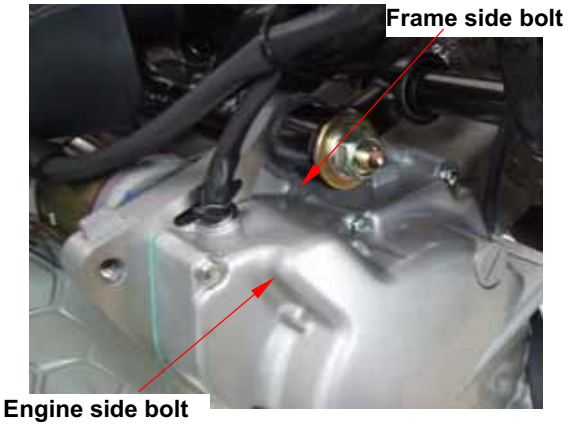
Drain out coolant, and remove coolant inlet hose.



Remove left rear cushion lower bolt (1 bolt).



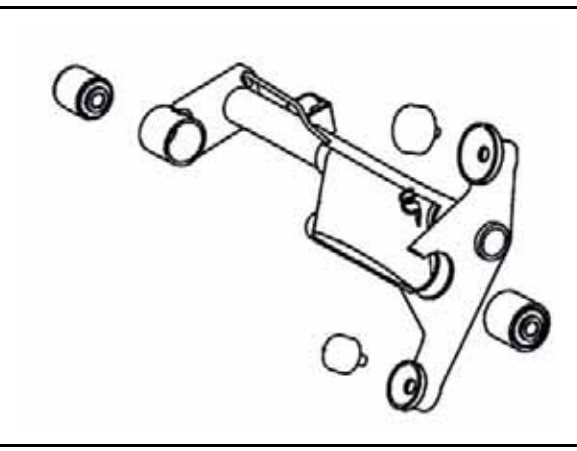
Remove frame side engine hanger bolts (each side 1 bolt), and then remove engine.



Engine Hanger

Removal

Remove the engine side bolts of engine hanger. (1 bolt on each side)
Remove the engine hanger.
Check if the engine hanger bush and cushion rubber for damage. If so, replace with new ones.



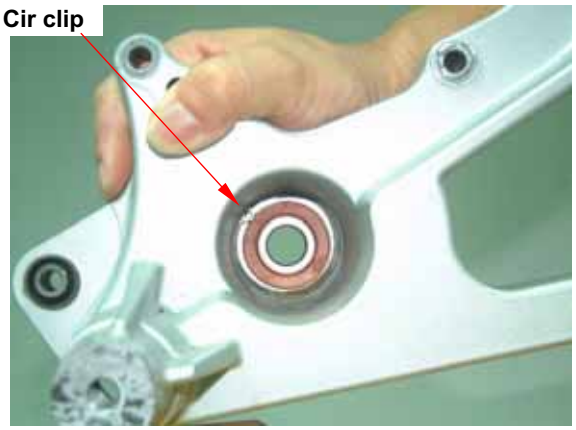
Installation

Tighten the bolts and nuts of engine hanger.
Engine hanger nut:
Torque Value: 7.5~9.5kgf-m

Rear Fork

Bearing Inspection

Check bearings on rear fork.
Rotate bearing inner ring with fingers.
Check if bearing can be turned in smooth and silent, and also check if bearing outer ring is mounted on rear fork tightly.
If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.



Bearing removal

Remove bearing mounting cir clip.
Drive the bearing out of the rear fork.

Bearing installation

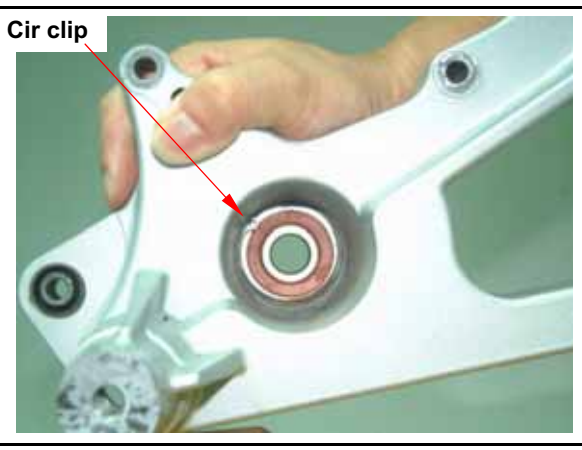
Install new rear axle bearing and baring puller into rear fork.
Special Service Tools:
Rear fork bearing puller SYM-6303000-6303

Install the washer of the 6303 bearing puller.

Install assembly directs puller bearing puller.
Special Service Tools:
Assembly directs puller SYM-2341110

Use screw driver holder bearing puller lower part, and turn the bearing puller upper part to install the rear fork bearing.

Install bearing mounting cir clip.



Removal of Engine Mount Bushing

If engine hanger frame and the cushion rubber of rear cushion bushing are damaged. Then use the bushing remover / presser, ø28mm & ø20mm, to press the bushing out and replace it with new one.

Engine hanger bushing: ø **28mm**
Rear cushion bushing: ø **20mm**

Pressing out

Place the detent section of the bushing remover toward the bushing, and drive both the pressing ring and bolt in to press the bushing out.

Special Service Tools:
Crankcase bushing remover SYM-1120310
Crankcase bushing remover SYM-1120320

Pressing In

Place the flat section of the remover toward the bushing, and then drive the bushing, pressing ring, and bolt in to install the bushing.

Installation of Engine

Install the engine according to the reversing order of removal.

⚠ Caution

- Note both feet and hands safety for squeezing as engine installation.
- Do not bent or squeeze each wires or hose.
- Route all cables and wires in accordance with the routine layout.

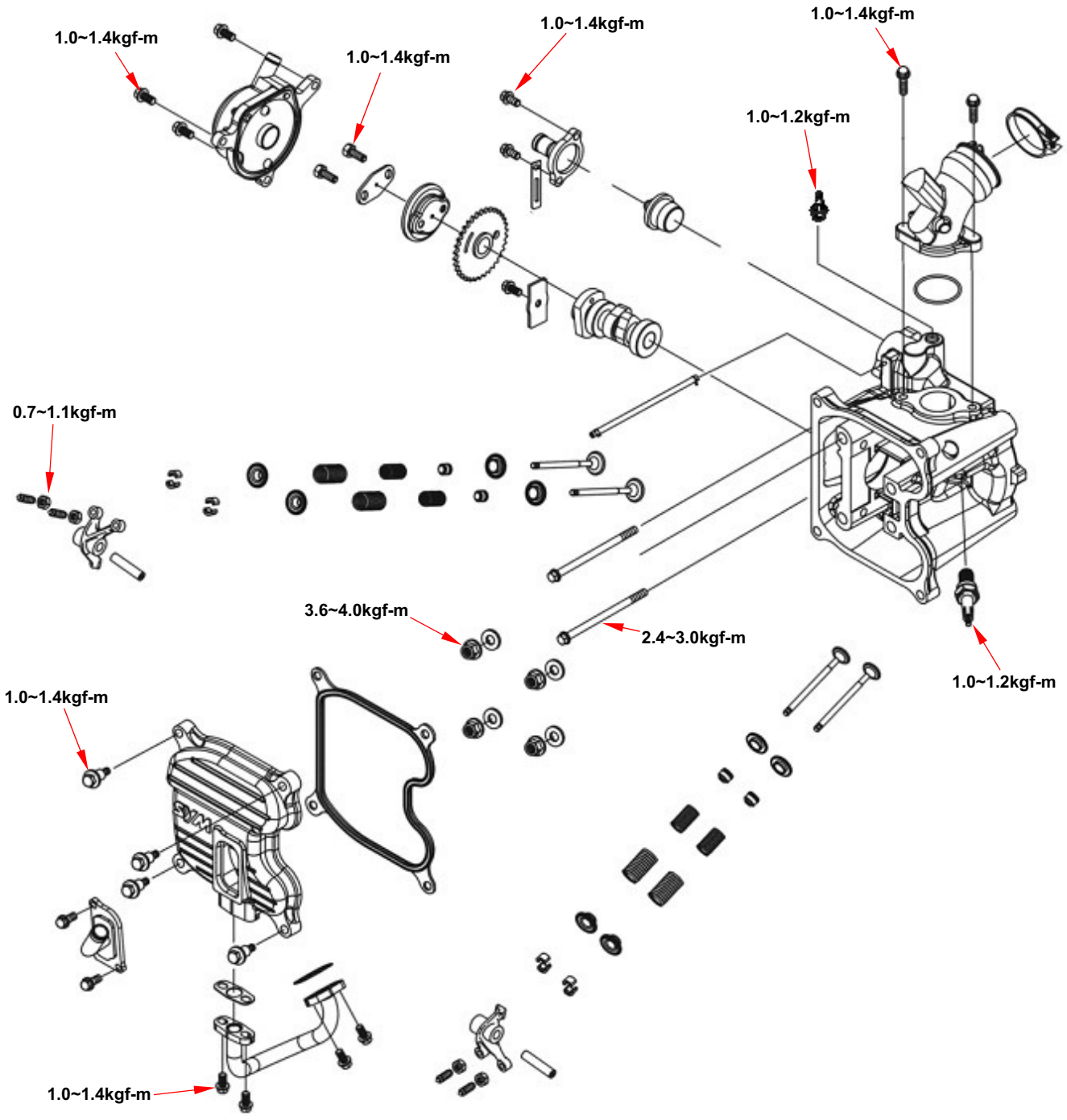
Engine hanger nut:
Torque Value: 7.5~9.5kgf-m

Rear cushion bolt:
Torque Value: upper: 3.5~4.5kgf-m
under: 2.4~3.0kgf-m

Rear wheel axle nut:
Torque Value: 11.0~13.0kgf-m

Mechanism Diagram ····· 6-1	Valve Stem Replacement ····· 6-10
Precautions in Operation ····· 6-2	Valve Seat Inspection and Service ··· 6-11
Troubleshooting ····· 6-3	Cylinder Head Reassembly ····· 6-13
Cylinder Head Removal ····· 6-4	Cylinder Head Installation ····· 6-14
Cylinder Head Disassembly ····· 6-6	Valve Clearance Adjustment ····· 6-16
Cylinder Head Inspection ····· 6-8	

Mechanism Diagram



Precautions in Operation

General Information

- This chapter is contained maintenance and service for cylinder head, valve, and camshaft as well as rocker arm.
- Cylinder head service can be carried out when engine is in frame.

Specification

Item			Standard	Limit
Compression pressure			12±2 kg/cm2	---
Camshaft	Height of cam lobe	Intake	34.880	34.860
		Exhaust	34.740	34.725
Rocker arm	ID of valve rocker arm		11.982~12.000	12.080
	OD of valve rocker arm shaft		11.966~11.984	11.936
Valve	OD of valve stem	Intake	4.975~4.990	4.900
		Exhaust	4.950~4.975	4.900
	ID of valve guide		5.000~5.012	5.030
	Clearance between valve stem and guide	Intake	0.010~0.037	0.080
		Exhaust	0.025~0.062	0.100
	Free length of valve spring	Inner	38.700	35.200
		outer	40.400	36.900
	Valve seat width		1.600	---
	Valve clearance	Intake	0.10±0.02mm	---
		Exhaust	0.15±0.02mm	---
Tilt angle of cylinder head			---	0.050

Torque Value

Cylinder head cover bolt	1.0~1.4kgf-m
Exhaust pipe stud bolt	2.4~3.0kgf-m
Cylinder head bolt	1.0~1.4kgf-m
Cylinder head Nut	3.6~4.0kgf-m
Sealing bolt of cam chain auto-tensioner	0.8~1.2kgf-m
Bolt of cam chain auto-tensioner	1.2~1.6kgf-m
Cylinder side cover bolt	1.0~1.4kgf-m
Cam sprocket bolt	1.0~1.4kgf-m
Tappet adjustment screw nut	0.7~1.1kgf-m
Spark plug	1.0~1.2kgf-m

Tools

Special service tools

Valve reamer: 5.0mm
Valve guide driver: 5.0mm
Valve spring compressor

Troubleshooting

Engine performance will be affected by troubles on engine top parts. The trouble usually can be determined or by performing cylinder compression test and judging the abnormal noise generated.

Low compression pressure

1. Valve

- Improper valve adjustment
- Burnt or bent valve
- Improper valve timing
- Valve spring damage
- Valve carbon deposit.

2. Cylinder head

- Cylinder head gasket leaking or damage
- Tilt or crack cylinder

3. Piston

- Piston ring worn out.

High compression pressure

- Too much carbon deposit on combustion chamber or piston head

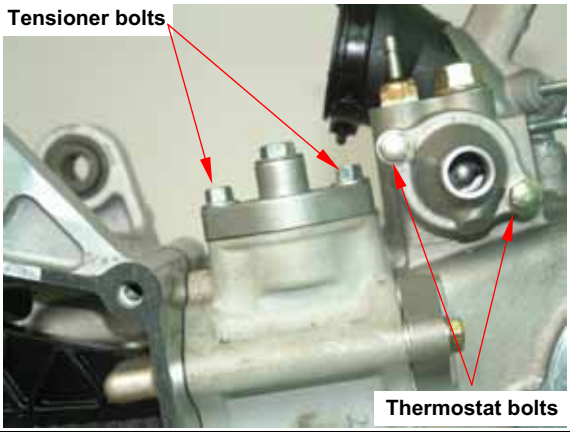
Noise

- Improper valve clearance adjustment
- Burnt valve or damaged valve spring
- Camshaft wear out or damage
- Chain wear out or looseness
- Auto-tensioner wear out or damage
- Camshaft sprocket
- Rocker arm or rocker arm shaft wear out

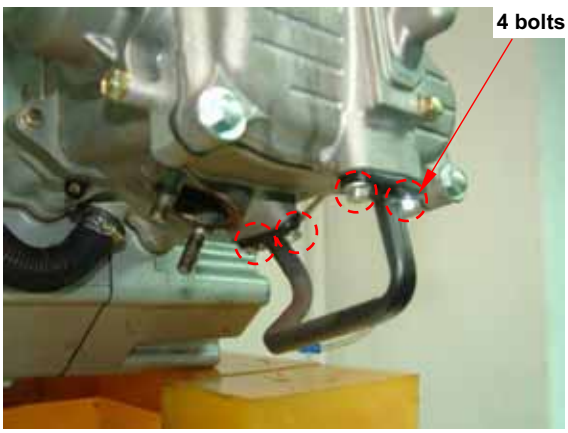
Cylinder Head Removal

Remove engine. (Refer to chapter 5)

Remove 2 bolts of thermostat and then remove the thermostat.
Remove hole bolt and spring for the cam chain tensioner.
Loosen 2 bolts, and then remove tensioner.
Remove thermostat (2 bolts).

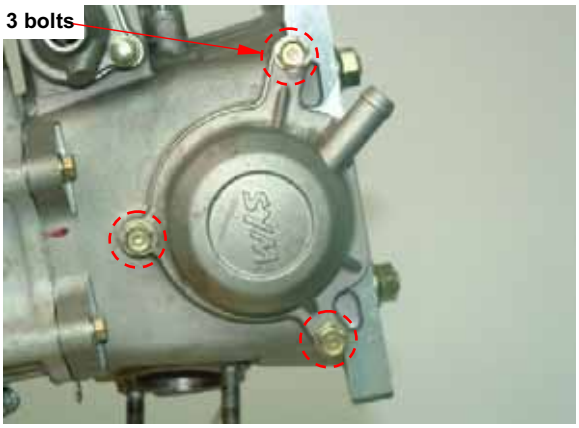


Remove Air Injection system (AI) pipe mounting bolts.
Remove spark plug.

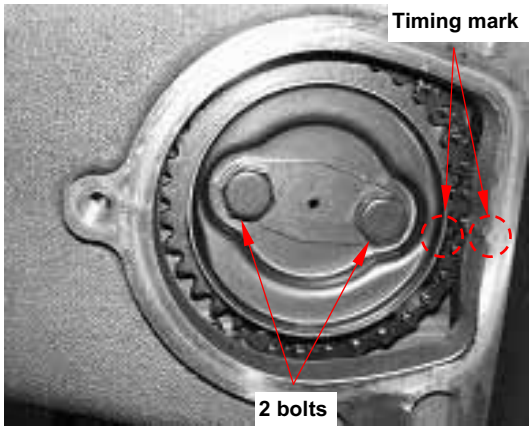


Remove cylinder head cover (4 bolts).

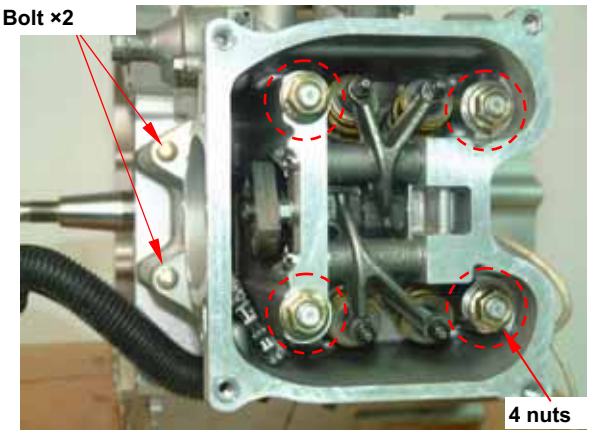
Remove the side cover mounting blots of cylinder head, and then take out the side cover.



Remove left crankcase cover, and turn the
Turn the drive face, and align the timing mark on the sprocket with that of cylinder head, piston is at TDC position.
Remove cam sprocket bolts and then remove the sprocket by prying chain out.



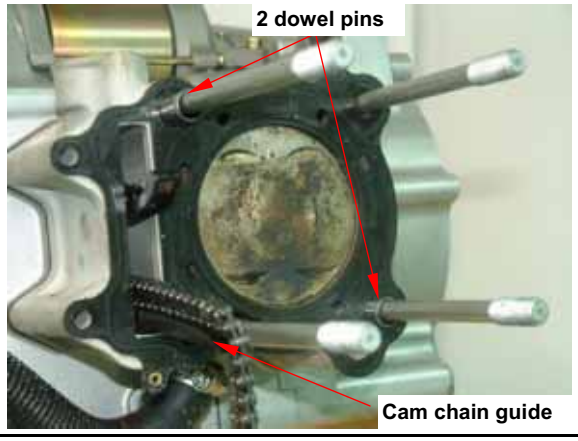
Remove the 2 cylinder head mounting bolts from cylinder head right side, and then remove 4 nuts and washers from cylinder head upper side.
Remove the cylinder head.



Remove cylinder head gasket and 2 dowel pins.
Remove chain guide.
Clean up residues from the matching surfaces of cylinder and cylinder head.

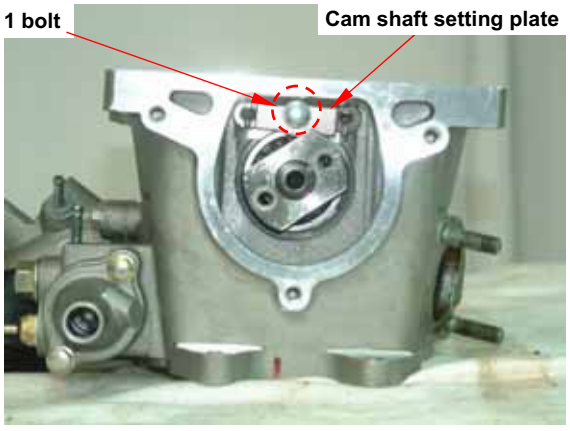
⚠ Caution

- Do not damage the matching surfaces of cylinder and cylinder head.
- Avoid residues of gasket or foreign materials falling into crankcase as cleaning.



Cylinder Head Disassembly

Remove cam shaft setting plate (1 bolt).



Remove rocker arm shafts and rocker arms.
Special Service Tool:
Rocker arm and cam shaft puller SYM-1445100

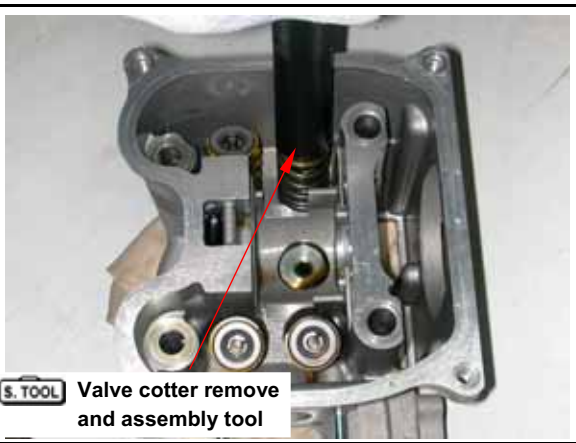
Remove cam shafts.
Special Service Tool:
Rocker arm and cam shaft puller SYM-1445100

Use a valve cotter remove & assembly tool to press the valve spring, and then remove valves.

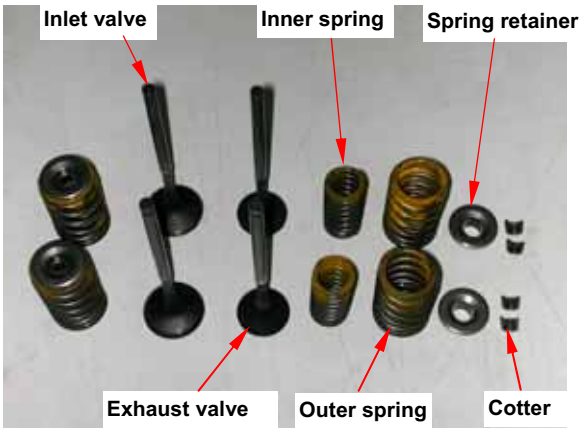
⚠ Caution

- In order to avoid loosing spring elasticity, do not press the spring too much. Thus, press length is based on the valve cotter in which can be removed.

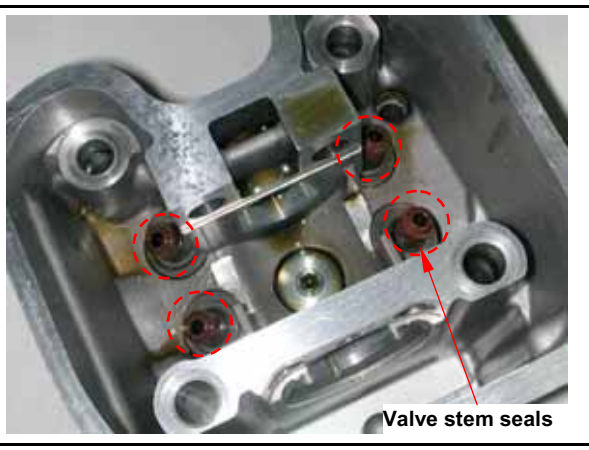
Special Service Tool:
Valve cotter remove & assembly tool SYM-1471110-SY125



Remove valve cotters, spring retainers, springs and valves.



Remove valve stem seals.



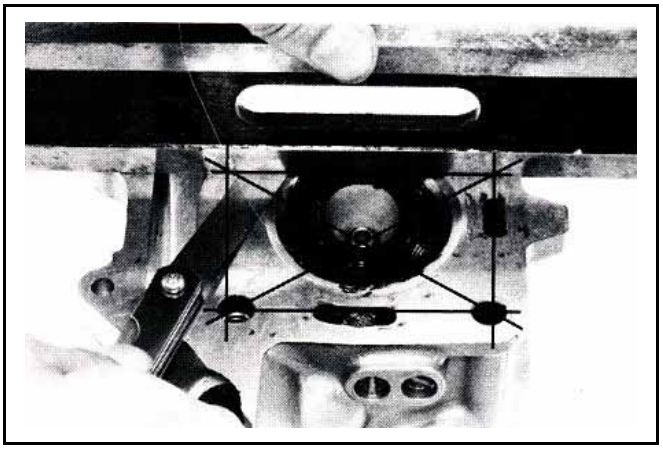
Clean carbon deposits in combustion chamber. Clean residues and foreign materials on cylinder head matching surface.

⚠ Caution

- Do not damage the matching surface of cylinder head.

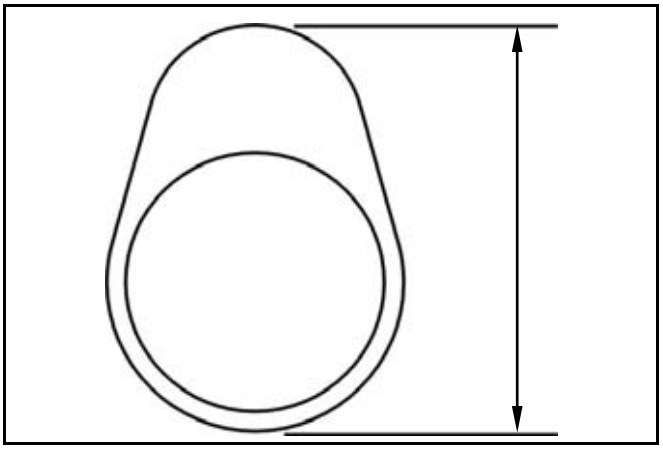
Cylinder Head Inspection

Check if spark plug and valve holes are cracked.
Measure cylinder head warp with a straightedge and thickness gauge.
Service limit: 0.05 mm



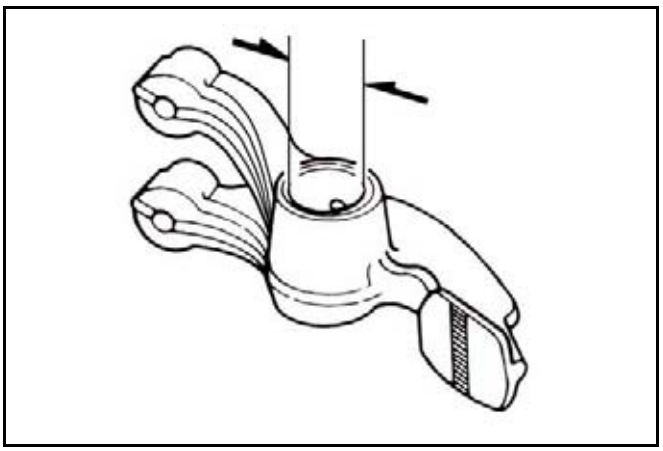
Camshaft

Inspect cam lobe height for damaged.
Service Limit:
IN: Replacement when less than 34.860mm
EX: Replacement when less than 34.725mm
Inspect the camshaft bearing for looseness or wear out. If any damage, replace whole set of camshaft and bearing.



Rocker Arm

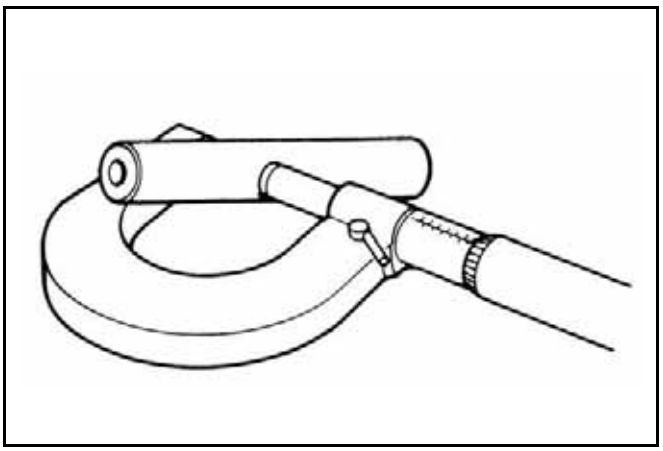
Measure the cam rocker arm I.D., and wear or damage, oil hole clogged?
Service Limit: Replace when it is less than 12.080 mm.



Rocker Arm Shaft

Measure the active O.D. of the cam rocker arm shaft and cam rocker arm.
Service Limit: Replace when it is less than 11.936 mm.

Calculate the clearance between the rocker arm shaft and the rocker arm.
Service Limit: Replace when it is less than 0.10 mm.



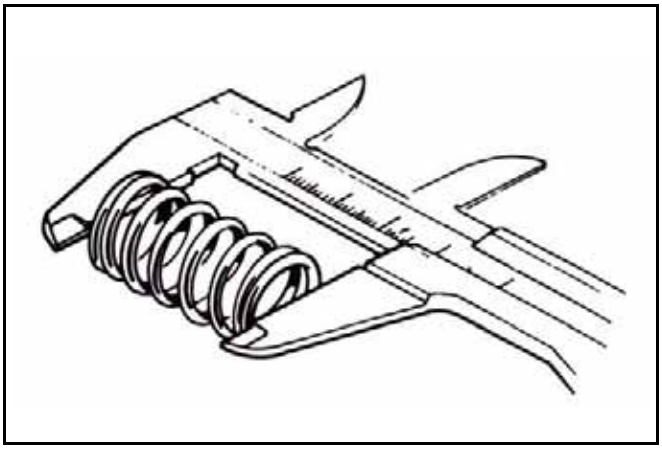
Valve spring free length

Measure the free length of intake and exhaust valve springs.

Service limit:

Inner spring 35.20 mm

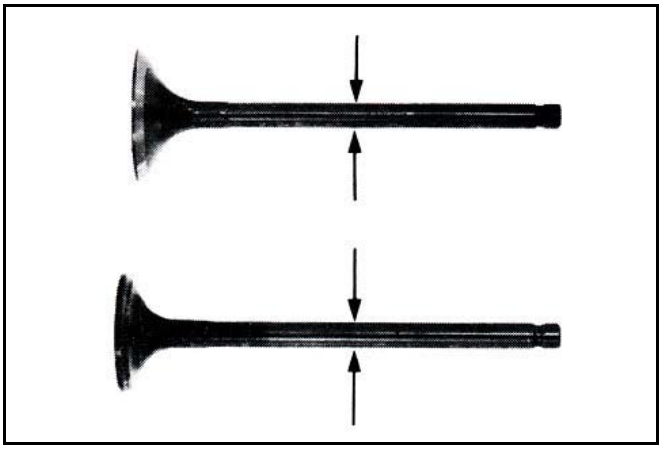
Outer spring 36.90 mm



Valve stem

Check if valve stems are bend, crack or burn.
Check the operation condition of valve stem in valve guide, and measure & record the valve stem outer diameter.

Service Limit: IN: 4.90 mm
EX: 4.90 mm

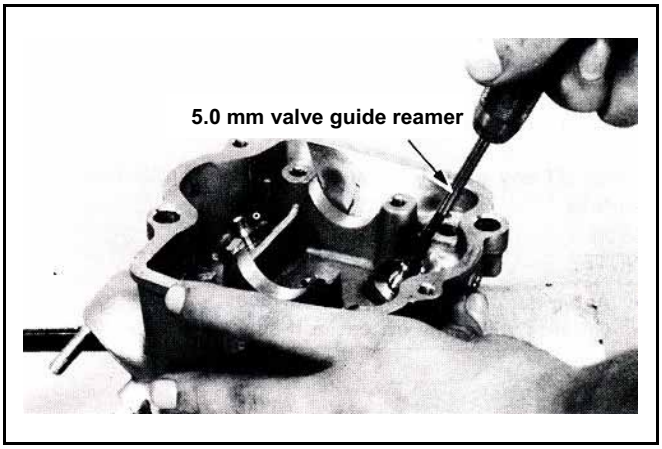


Valve guide

Caution

- Before measuring the valve guide, clean carbon deposits with reamer.

Tool: 5.0 mm valve guide reamer



Measure and record each valve guide inner diameters.

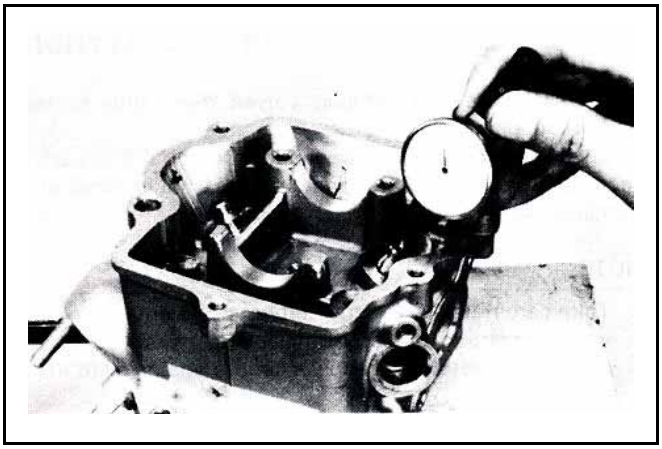
Service limit: 5.03 mm

The difference that the inner diameter of valve guide deducts the outer diameter of valve stem is the clearance between the valve stem and valve guide.

Service Limit: IN→0.08 mm
EX→0.10 mm

Caution

- If clearance between valve stem and valve guide exceeded service limit, check whether the new clearance that only replaces new valve guide is within service limit or not. If so, replace valve guide.



Correct it with reamer after replacement.
If clearance still exceeds service limit after replaced valve guide, replace valve stem too.

Caution

- It has to correct valve seat when replacing valve guide.

Valve Stem Replacement

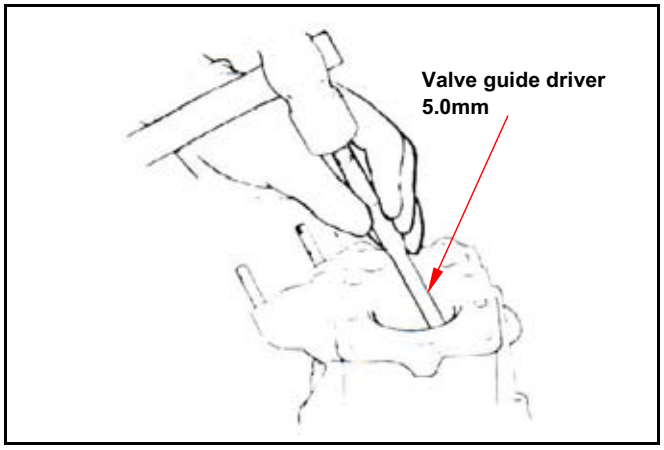
Heat up cylinder head to 100~150 ℃ with heated plate or toaster.

⚠ Caution

- Do not let torch heat cylinder head directly. Otherwise, the cylinder head may be deformed as heating it.
- Wear on a pair of glove to protect your hands when operating.

Hold the cylinder head, and then press out old valve guide from combustion chamber side.

Tool: Valve guide driver: 5.0 mm



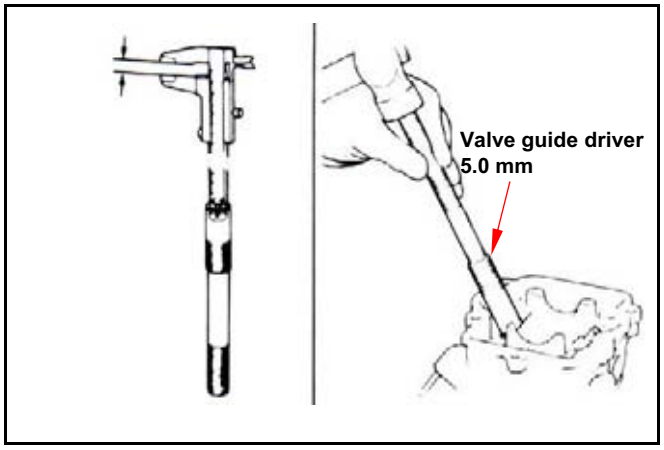
⚠ Caution

- Check if new valve guide is deformation after pressed it in.
- When pressing in the new valve guide, cylinder head still have to be kept in 100~150℃.

Adjust the valve guide driver and let valve guide height is in 13 mm.

Press in new valve guide from rocker arm side.

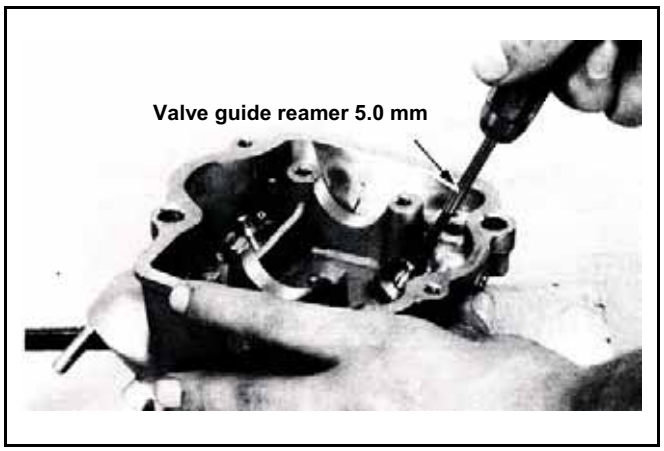
Tool: Valve guide driver: 5.0 mm



Wait for the cylinder head cooling down to room temperature, and then correct the new valve guide with reamer.

⚠ Caution

- Using cutting oil when correcting valve guide with a reamer.
- Turn the reamer in same direction when it be inserted or rotated.



Correct valve seat, and clean up all metal residues from cylinder head.

Tool: Valve guide reamer: 5.0 mm

Valve Seat Inspection and Service

Clean up all carbon deposits onto intake and exhaust valves.
Apply with emery slightly onto valve contact face.
Grind valve seat with a rubber hose or other manual grinding tool.

⚠ Caution

- Do not let emery enter into between valve stem and valve guide.
- Clean up the emery after corrected, and apply with engine oil onto contact faces of valve and valve seat.

Remove the valve and check its contact face.

⚠ Caution

- Replace the valve with new one if valve seal is roughness, wear out, or incomplete contacted with valve seat.

Valve seat inspection

If the valve seat is too width, narrow or rough, corrects it.

Valve seat width

Service limit: 1.6mm
Check the contact condition of valve seat.

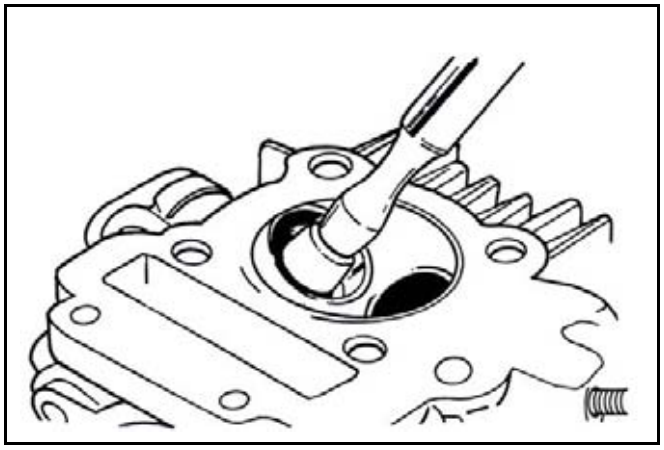
Valve seat grinding

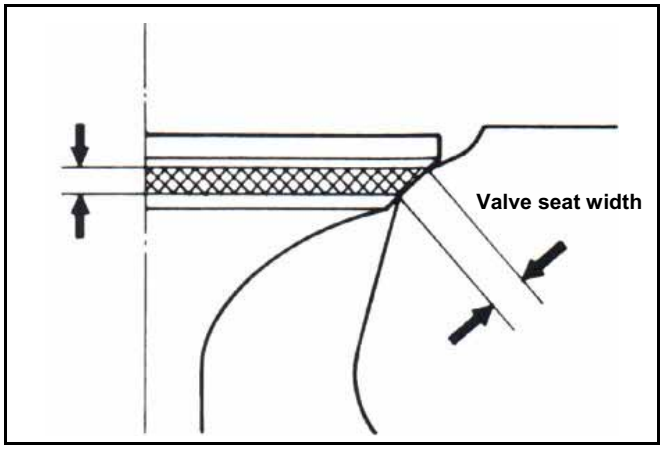
The worn valve seat has to be ground with valve seat chamfer cutter.
Refer to operation manual of the valve seat chamfer cutter.
Use 45° valve seat chamfer cutter to cut any rough or uneven surface from valve seat.

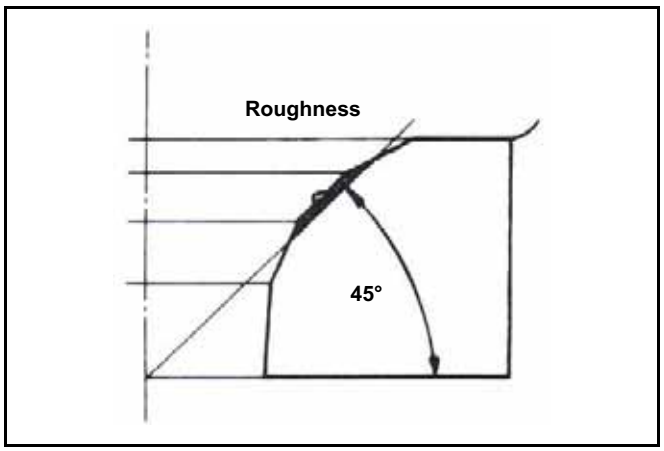
⚠ Caution

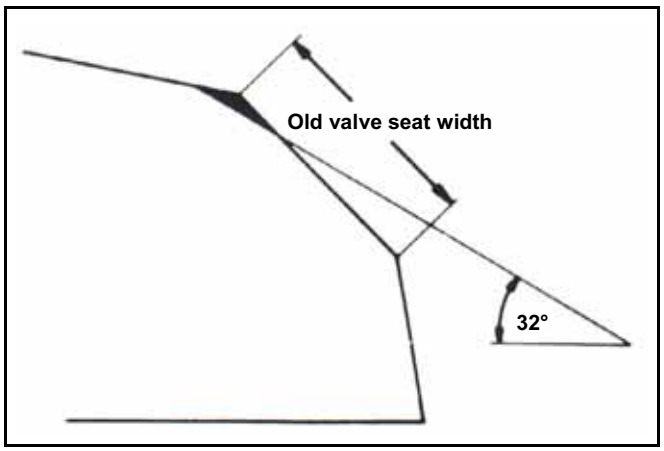
- After valve guide had been replaced, it has to be ground with 45° valve seal chamfer cutter to correct its seat face.

Use 32° cutter to cut a quarter upper parts out.

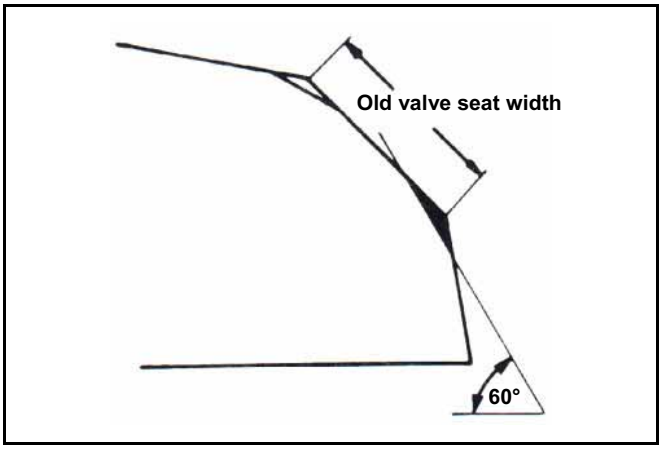








Use 60° cutter to cut a quarter lower parts out.
Remove the cutter and check new valve seat.

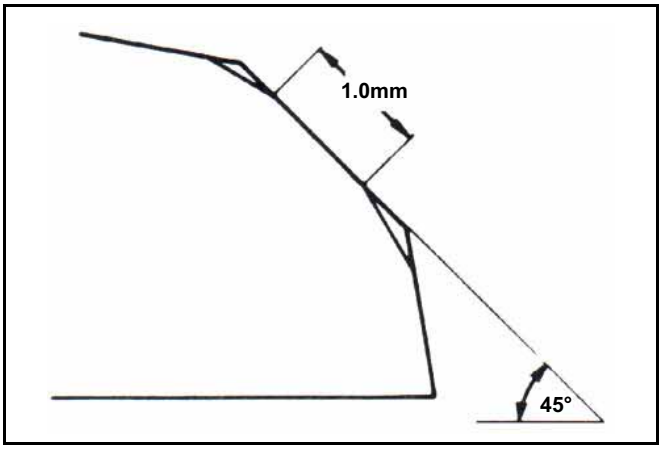


Use 45° cutter to grind the valve seat to specified width.

⚠ Caution

- Make sure that all roughness and uneven faces had been ground.

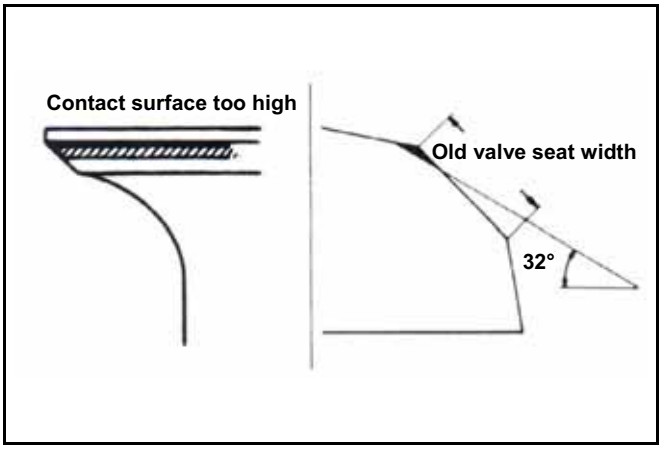
Grind valve seat again if necessary.



Coat the valve seat surface with red paint.
Install the valve through valve guide until the valve contacting with valve seat, slightly press down the valve but do not rotate it so that a seal track will be created on contact surface.

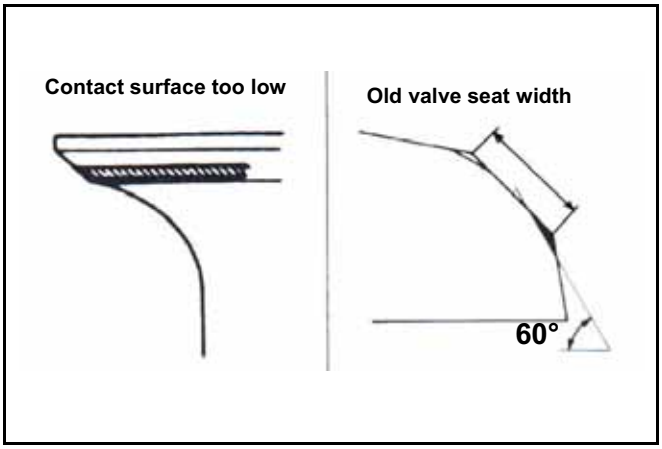
⚠ Caution

- The contact surfaces of valve and valve seat are very important to the valve sealing capacity.

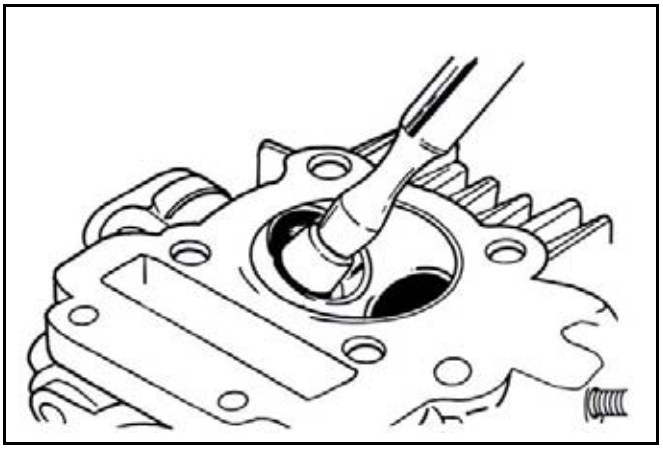


If the contact surface is too high, grind the valve seat with 32° cutter.
Then, grind the valve seat to specified width.

If the contact surface too low, grind the valve seat with 60° cutter.
Then, grind the valve seat to specified width.



After the valve seat ground, coat valve seat surface with emery and then slightly press the ground surface.
Clean up all emery coated onto cylinder and valve after ground.

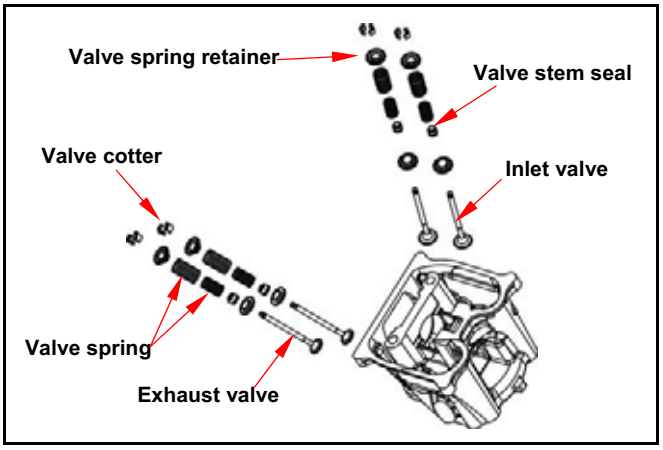


Cylinder Head Reassembly

Lubricate valve stem with engine oil, and then insert the valve into valve guide.
Install new valve stem oil seal.
Install valve springs and retainers.

⚠ Caution

- The closed coils of valve spring should face down to combustion chamber.

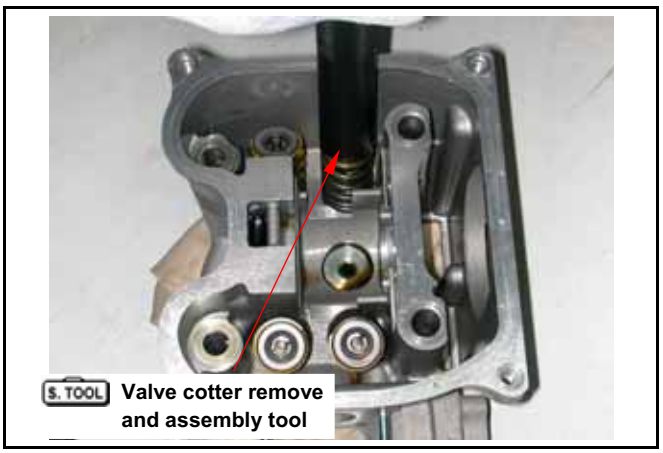


Put the valve cotters onto valve spring retainer.
Use a valve cotter remove & assembly tool to press the valve springs, and then install valves.

⚠ Caution

- In order to avoid damaging the valve stem and the cylinder head, in the combustion chamber place a rag between the valve spring remover/installer as compressing the valve spring directly.

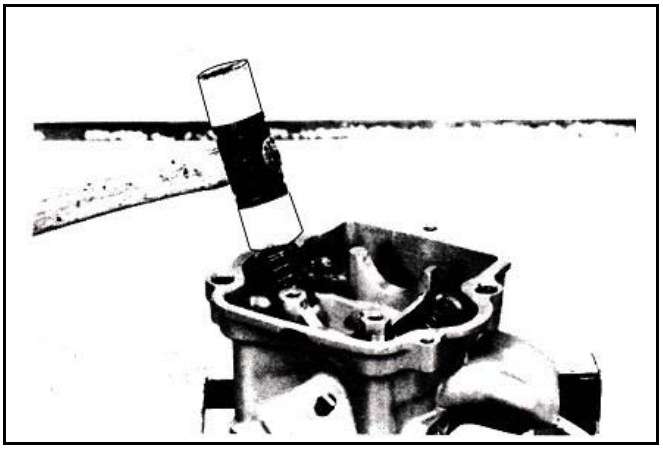
Special Service Tool:
Valve cotter remove & assembly tool
SYM-1471110-SY125



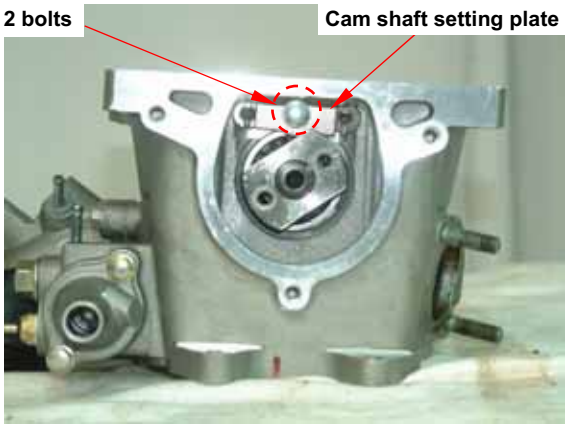
Tap the valve stems gently with a plastic hammer to make sure valve retainer and valve cotter is settled.

⚠ Caution

- Place and hold cylinder head on to working table so that can prevent from valve damaged.



Install camshaft into cylinder head.
Install valve rocker arm, rocker arm shaft and cam shaft setting plate.

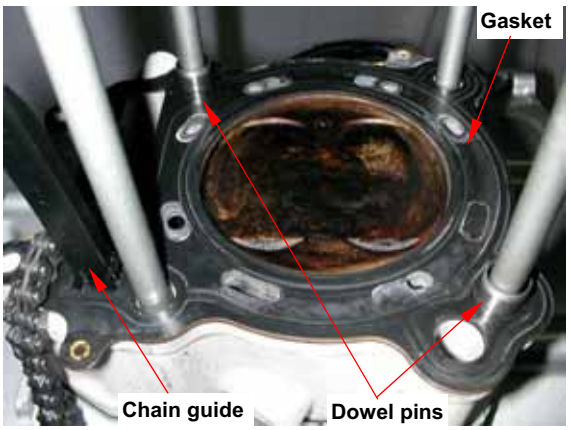


Cylinder Head Installation

Clean up all residues and foreign materials onto the matching surfaces of both cylinder and cylinder head.
Install chain guide, dowel pins and a new cylinder head gasket onto the cylinder.

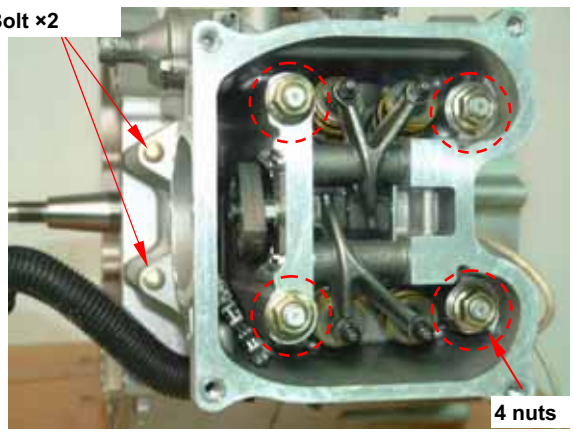
⚠ Caution

- Do not damage the matching surfaces of cylinder and cylinder head.
- Avoid residues of gasket or foreign materials falling into crankcase as cleaning.



Install 4 washers and tighten 4 nuts on the cylinder head upper side, and then tighten 2 cylinder head mounting bolts of cylinder head right side.

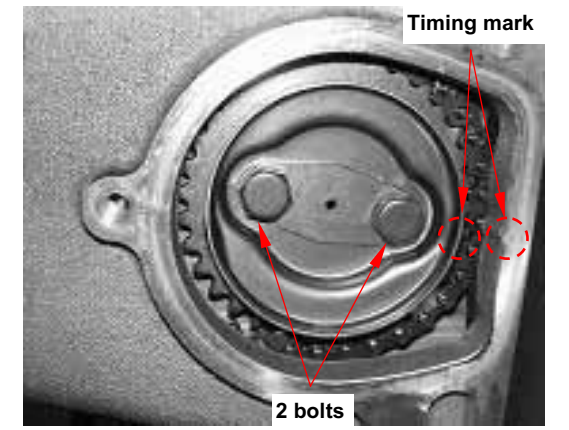
Torque value:
Nut 3.6~4.0kgf-m
Bolt 1.0~1.4kgf-m



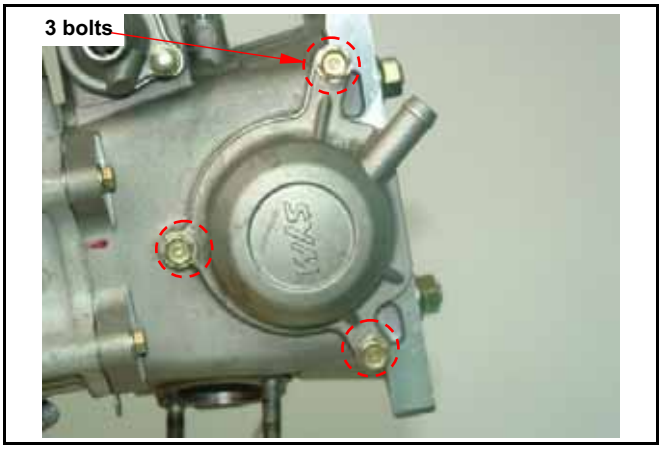
Install cam chain on to sprocket and align the timing mark on the sprocket with that of cylinder head.
Align sprocket bolt hole with camshaft bolt hole.
Tighten the sprocket mounting bolts.

⚠ Caution

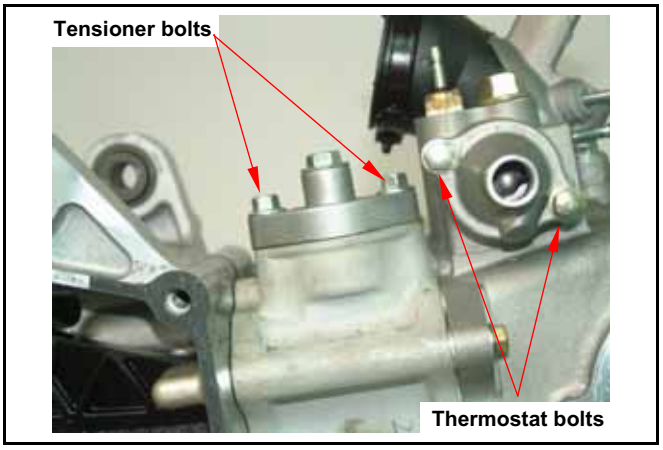
- Make sure timing marks are matched.



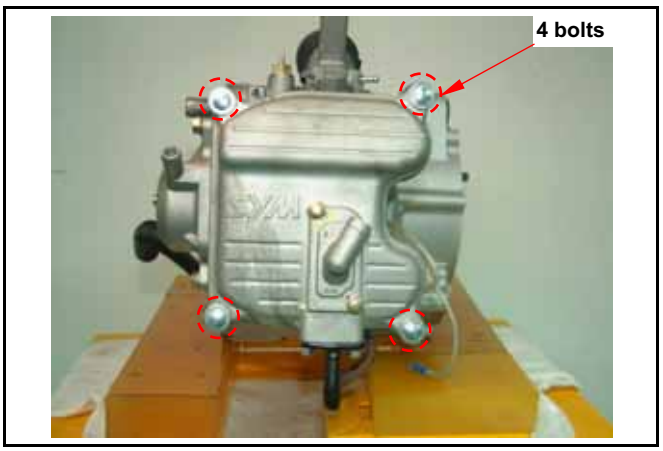
Install cylinder head side cover (3 bolts).



Install thermostat (2 bolts).
Loosen auto tensioner adjustment bolt and remove bolt and spring.
Install tensioner and install spring and adjustment bolt.



Install cylinder cover (4 bolts).

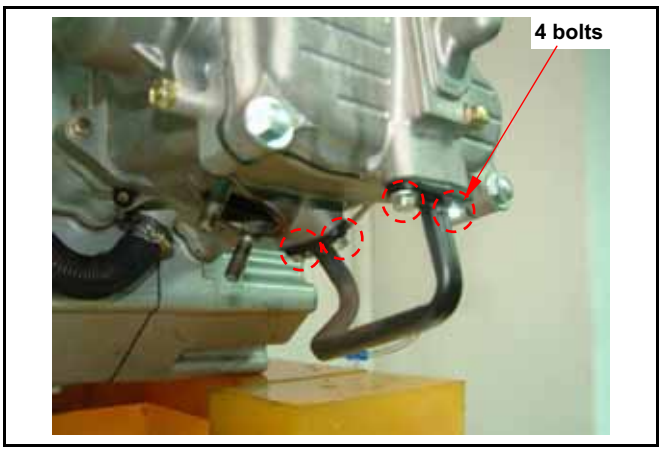


Install Air Injection system (AI) pipe. (4 bolts)
Install inlet pipe onto cylinder head.
Install and tighten spark plug.
Torque value: 1.0~2.0kgf-m

⚠ Caution

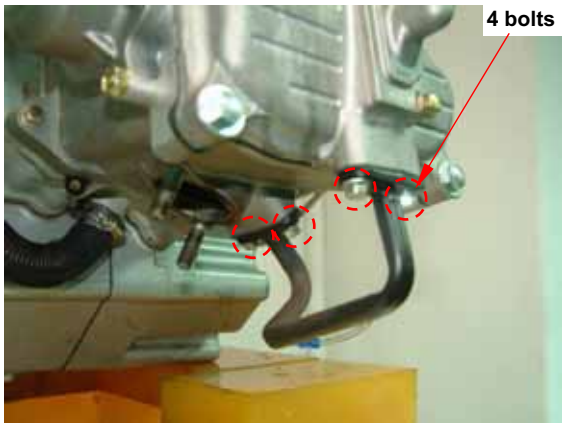
- This model is equipped with more precision 4-valve mechanism so its tighten torque can not be exceeded standard value in order to avoid causing cylinder head deformation, engine noise and leaking so that motorcycle's performance be effected.

Install the engine onto frame (refer chapter 5).

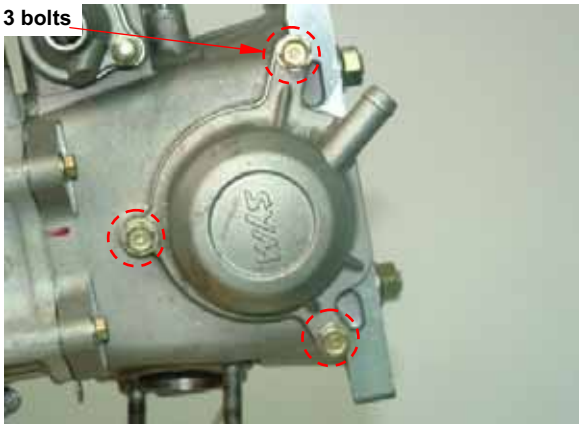


Valve Clearance Adjustment

Loosen Air Injection system (AI) pipe upper side bolt (2 bolts).
Remove cylinder head cover.

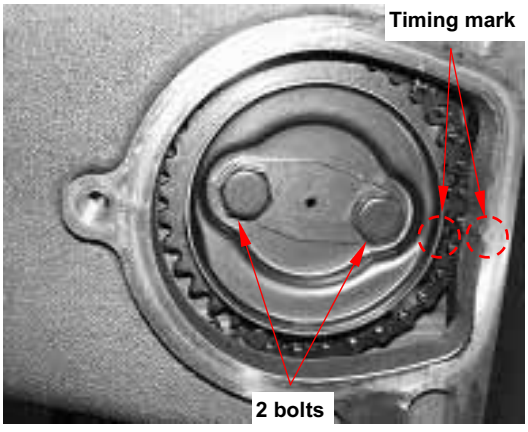


Remove the cylinder head side cover.



Remove left crankcase cover, and turn the drive face, and align the timing mark on the cam sprocket with that of cylinder head, piston is at TDC position.
Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.
Measure and adjust valve clearance with feeler gauge.
After valve clearance had been adjusted to standard value, hold adjustment bolt and then tighten the Adjustment nut.

Standard Value: **IN 0.10 ± 0.02 mm**
EX 0.15 ± 0.02 mm



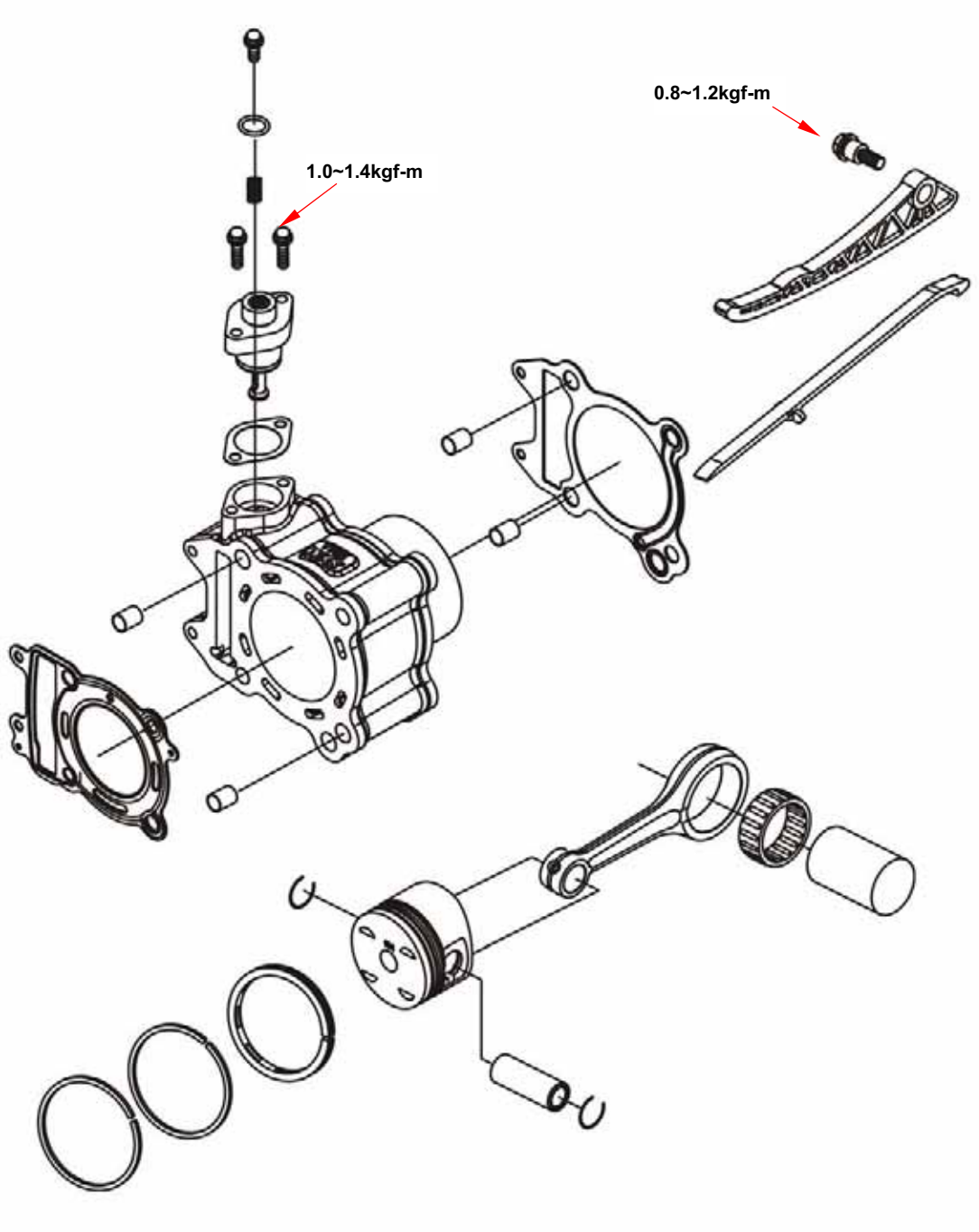
Install the cylinder head side cover.
Start the engine and make sure that engine oil flows onto the cylinder head.
Stop the engine after confirmed, and then install the cylinder head cover and AI pipe.

⚠ Caution

- If lubricant does not flow to cylinder head, engine components will be worn out seriously. Thus, it must be confirmed.
- When checking lubricant flowing condition, run the engine in idle speed. Do not accelerate engine speed.

Mechanism Diagram ····· 7-1	Piston Ring Installation ····· 7-6
Precautions in Operation ····· 7-2	Piston Installation ····· 7-7
Trouble Diagnosis ····· 7-2	Cylinder Installation ····· 7-7
Cylinder and Piston Removal ····· 7-3	

Mechanism Diagram



Precautions in Operation

General Information

- Both cylinder and piston service cannot be carried out when engine mounted on frame.

Specification

Unit：mm

Item			Standard	Limit
Cylinder	ID		72.995~73.015	73.100
	Bend		-	0.050
Piston/ Piston ring	Clearance between piston rings	Top ring	0.015~0.050	0.090
		2nd ring	0.015~0.050	0.090
	Ring-end gap	Top ring	0.150~0.300	0.500
		2nd ring	0.300~0.450	0.650
		Oil ring side rail	0.200~0.700	-
	OD of piston (2nd)		72.430~72.480	72.380
	Clearance between piston and cylinder		0.010~0.040	0.100
	ID of piston pin boss		17.002~17.008	17.020
OD of piston pin			16.994~17.000	16.960
Clearance between piston and piston pin			0.002~0.014	0.020
ID of connecting rod small-end			17.016~17.034	17.064

Trouble Diagnosis

Low or Unstable Compression Pressure

- Cylinder or piston ring worn out

Smoking in Exhaust Pipe

- Piston or piston ring worn out
- Piston ring installation improperly
- Cylinder or piston damage

Knock or Noise

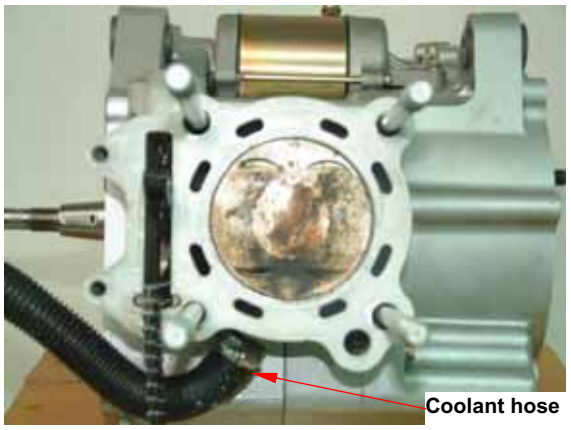
- Cylinder or piston ring worn out
- Carbon deposits on cylinder head top-side
- Piston pin hole and piston pin wear out

Engine Overheat

- Carbon deposits on cylinder head top side
- Cooling pipe clogged or not enough in coolant flow

Cylinder and Piston Removal

Remove cylinder head (refer to chapter 6).
Remove coolant hose from cylinder.
Remove cylinder.



Cover the holes of crankcase and cam chain with a piece of cloth.
Remove piston pin clip, and then remove piston pin and piston.

Remove cylinder gasket and dowel pin.
Clean up all residues or foreign materials from the two matching surfaces of cylinder and crankcase.

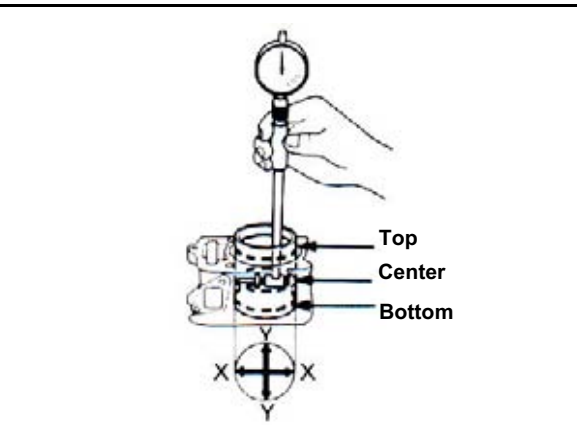
⚠ Caution

- Soap the residues into solvent so that the residues can be removed more easily.

Inspection

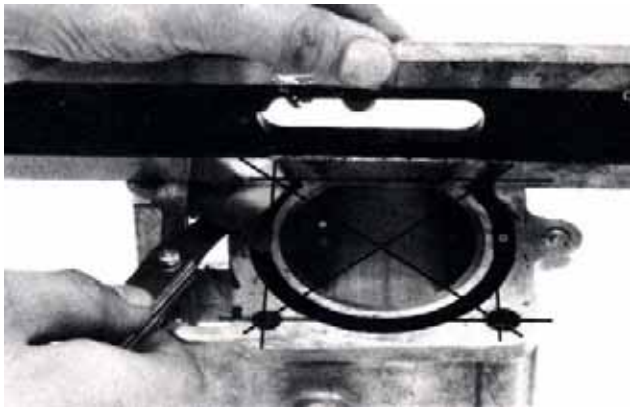
Check if the inner diameter of cylinder is wear out or damaged.
In the 3 positions, top, center and bottom, of cylinder, measure the X and Y values respective in the cylinder.

Service limit: 71.100 mm



Check cylinder if warp.

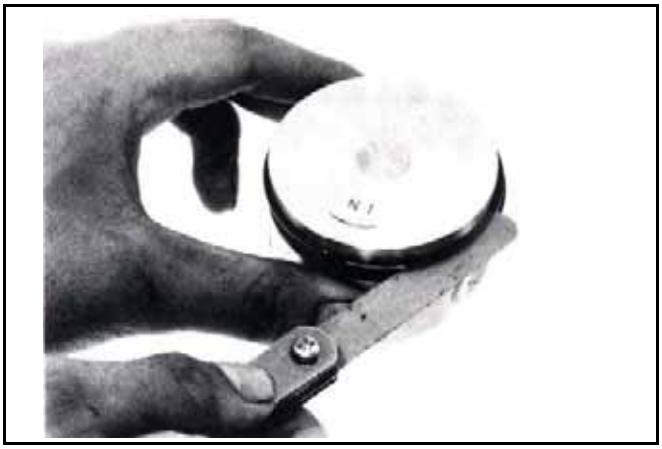
Service limit: 0.05 mm



Measure clearance between piston rings and grooves.

Service Limit: Top ring: 0.09 mm

2nd ring: 0.09 mm



Remove piston rings

Check if the piston rings are damaged or its grooves are worn.

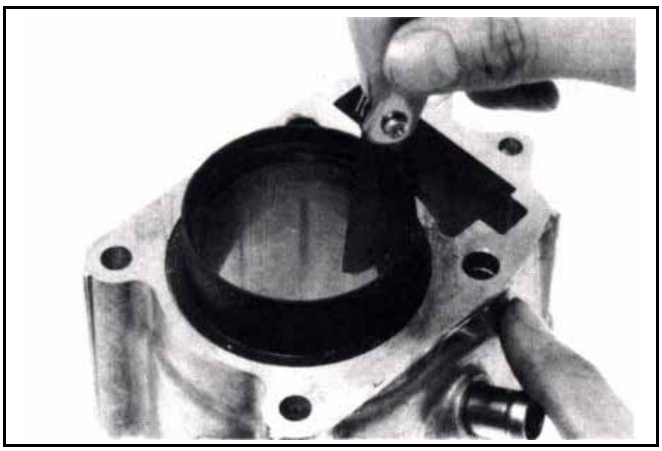
⚠ Caution

- Pay attention to remove piston rings because they are fragile.

Place piston rings respective into cylinder below 20 mm of cylinder top. In order to keep the piston rings in horizontal level in cylinder, push the rings with piston.

Service Limit: Top ring: 0.50 mm

2nd ring: 0.65 mm

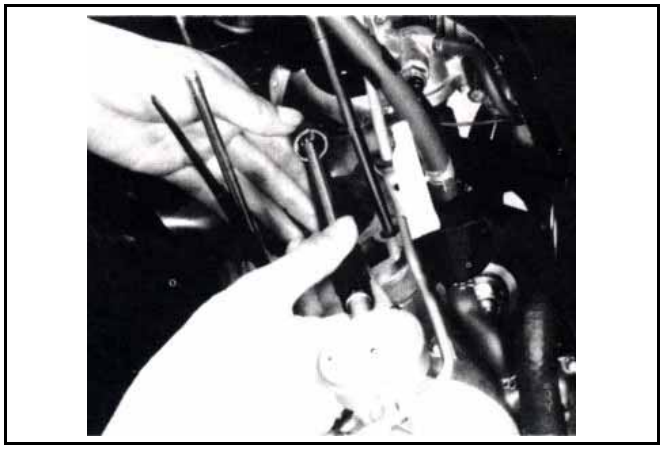


Measure the outer diameter of piston pin.

Service Limit: 16.96 mm

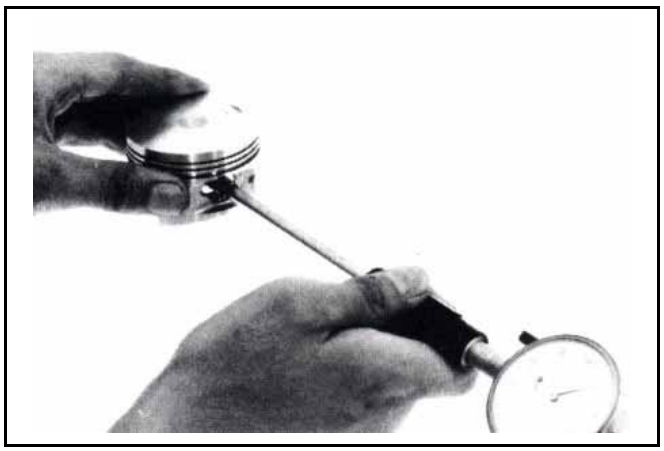
Measure the inner diameter of connecting rod small end.

Service Limit: 17.064 mm



Measure the inner diameter of piston pin hole.
Service Limit: **17.02 mm**
Calculate clearance between piston pin and its hole.

Service Limit: **0.02 mm**



Measure piston outer diameter.

⚠ Caution

- The measurement position is 10 mm distance from piston bottom side, and 90° to piston pin.

Service limit : 72.380 mm

Compare measured value with service limit to calculate the clearance between piston and cylinder.

Piston Ring Installation

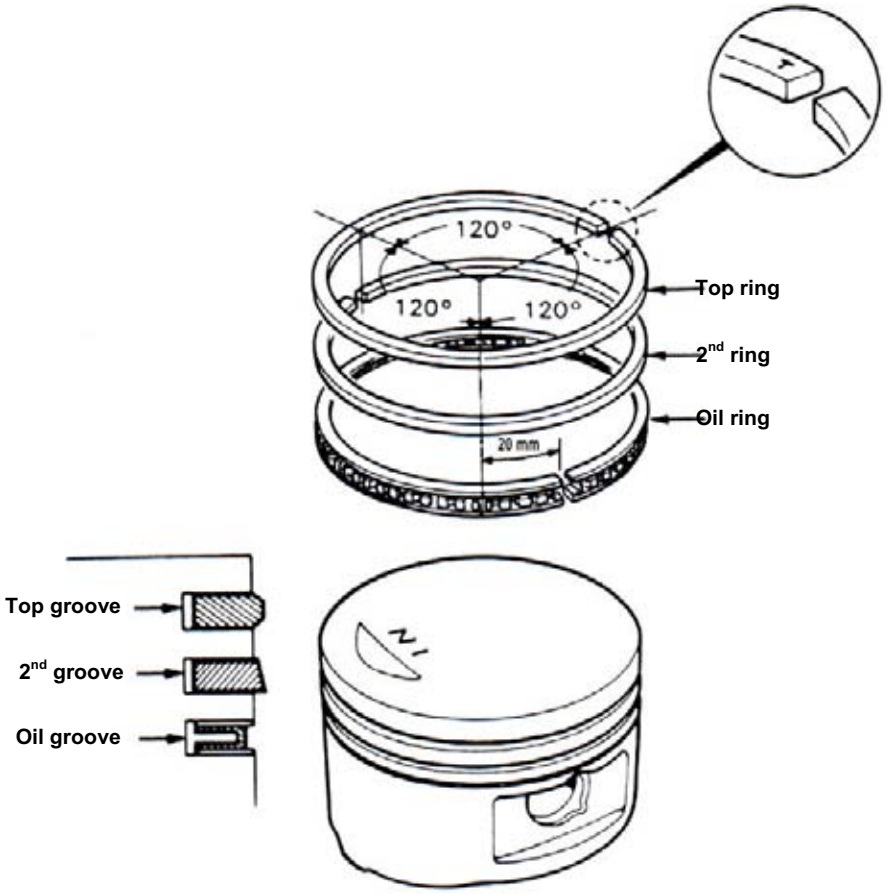
Clean up piston top, ring groove, and piston surface.

Install the piston ring onto piston carefully.

Place the openings of piston ring as diagram shown.

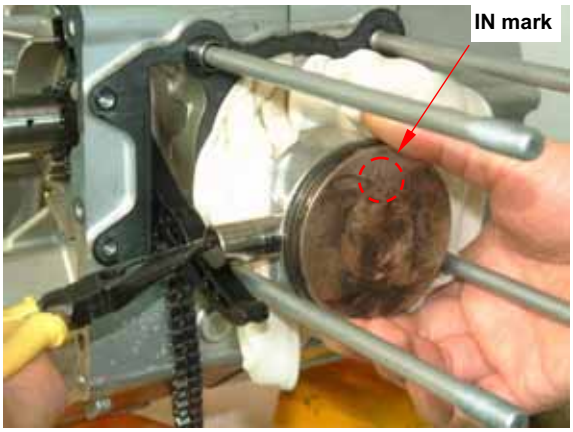
⚠ Caution

- Do not damage piston and piston rings as installation.
- All marks on the piston rings must be forwarded to up side.
- Make sure that all piston rings can be rotated freely after installed.



Piston Installation

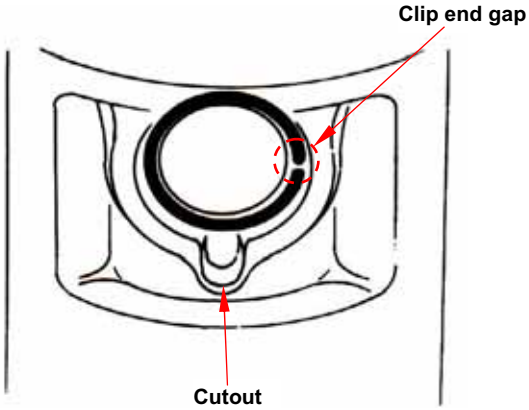
Install piston and piston pin, and place the IN marks on the piston top side forward to inlet valve.



Install new piston pin clip.

⚠ Caution

- Do not let the opening of piston pin clip align with the piston cutout.
- Place a piece of cloth between piston and crankcase in order to prevent snap ring from falling into crankcase as operation.



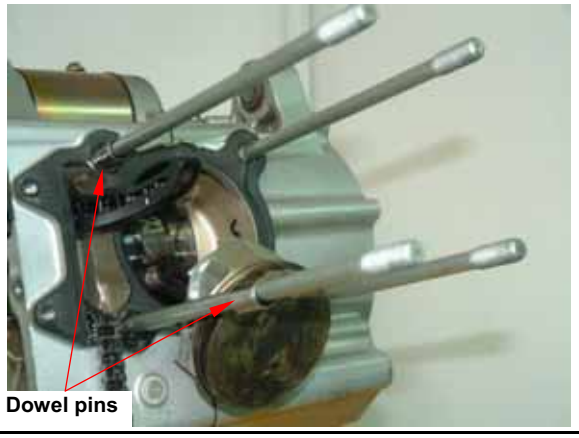
Cylinder Installation

Clean up all residues and foreign materials on the matching surface of crankcase. Pay attention to not let these residues and foreign materials fall into crankcase.

⚠ Caution

- Soap the residues into solvent so that the residues can be removed more easily.

Install dowel pins and new cylinder gasket.



Coat some engine oil to inside of cylinder, piston and piston rings.
Care to be taken when installing piston into cylinder. Press piston rings in one by one as installation.

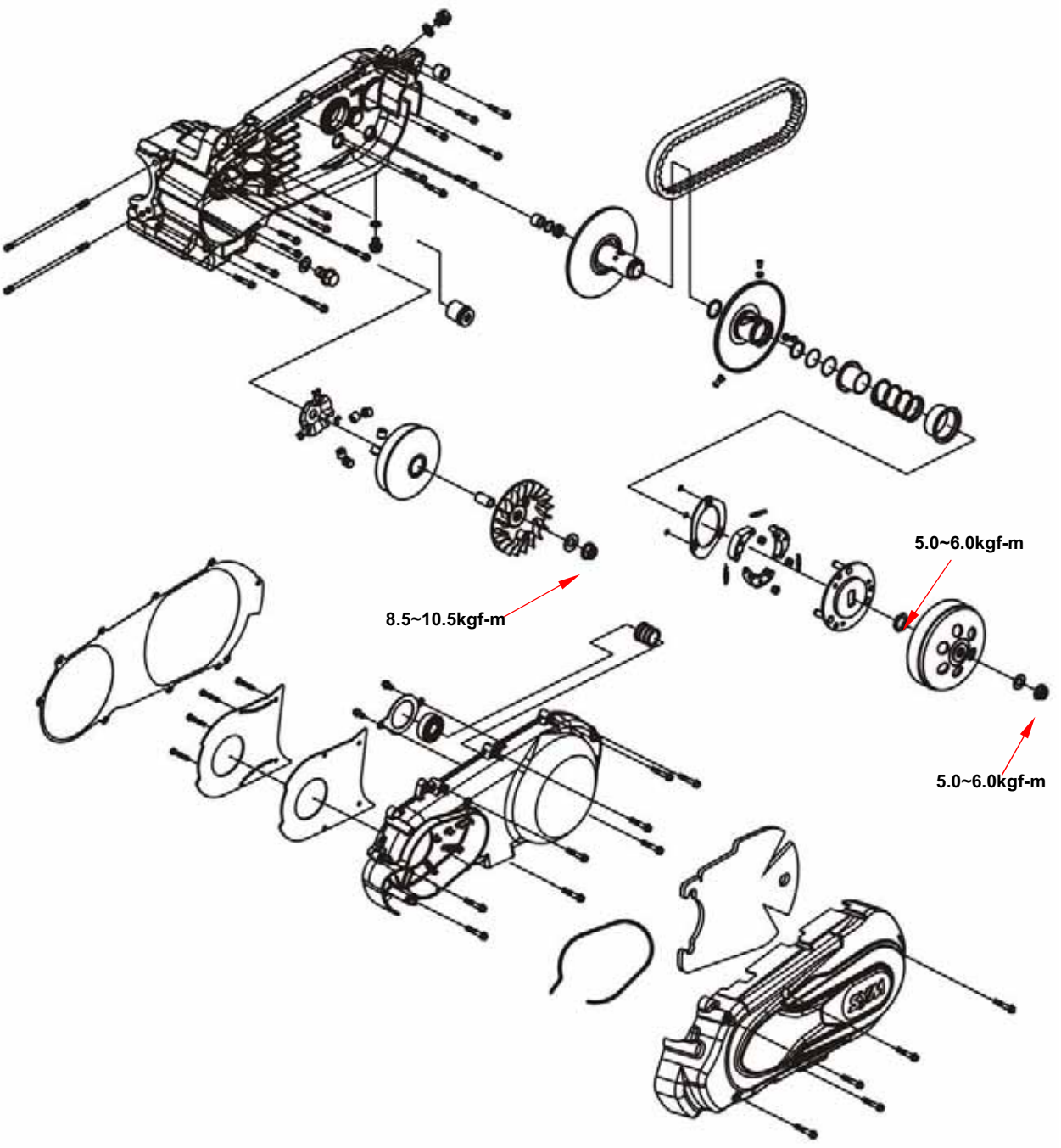
⚠ Caution

- Do not push piston into cylinder forcefully because piston and piston rings will be damaged.

Install coolant hose onto cylinder.
Install cylinder head (refer to Chapter 6).

Mechanism Diagram ····· 8-1	Drive Belt ····· 8-5
Maintenance Precaution ····· 8-2	Drive Face ····· 8-7
Trouble Diagnosis ····· 8-2	Clutch Outer / Driven Pulley ····· 8-10
Left Crankcase Cover ····· 8-3	

Mechanism Diagram



Maintenance Precaution

Precautions in Operation

- Drive face, clutch outer, and driven pulley can be serviced on the motorcycle.
- Drive belt and drive pulley must be free of grease.

Specification

Item	Standard value	Limit
Driving belt width	24.000 mm	22.500 mm
OD of movable drive face boss	29.946~29.980 mm	29.926 mm
ID of movable drive face	30.000~30.040 mm	30.060 mm
OD of weight roller	19.500~20.000 mm	19.000 mm
ID of clutch outer	144.850~145.150 mm	145.450 mm
Thickness of clutch weight	6.000 mm	3.000 mm
Free length of driven pulley spring	102.400 mm	97.400 mm
OD of driven pulley boss	40.950~40.990 mm	40.930 mm
ID of driven face	41.000~41.050 mm	41.070 mm
Weight of weight roller	17.700~18.300 g	17.200 g

Torque value

- Drive face nut: 8.5~10.5kgf-m
- Clutch outer nut: 5.0~6.0kgf-m
- Drive plate nut: 5.0~6.0kgf-m

Special Service Tools

Clutch spring compressor: SYM-2301000
Inner bearing puller: SYM-6204002
Clutch nut wrench 39 x 41 mm: SYM-9020200
Universal holder: SYM-2210100
Bearing driver: SYM-9100100

Trouble Diagnosis

Engine can be started but motorcycle can not be moved

1. Worn drive Belt
2. Worn drive face
3. Worn or damaged clutch weight
4. Broken driven pulley

Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight

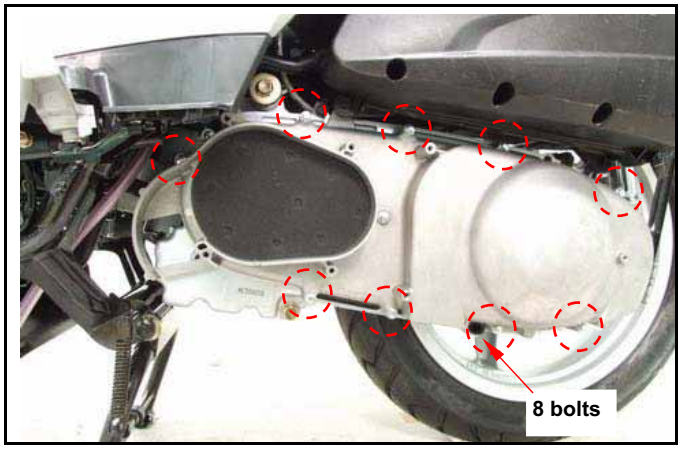
Insufficient horsepower or poor high speed performance

1. Worn drive belt
2. Insufficient spring force of driven pulley
3. Worn roller
4. Driven pulley operation un-smoothly

Left Crankcase Cover

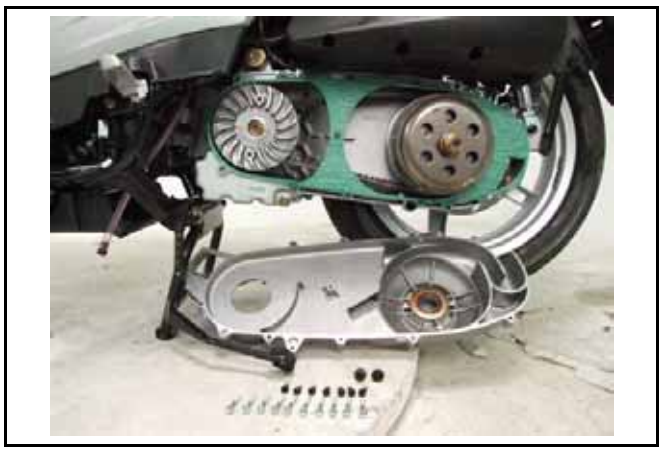
Left crankcase cover removal

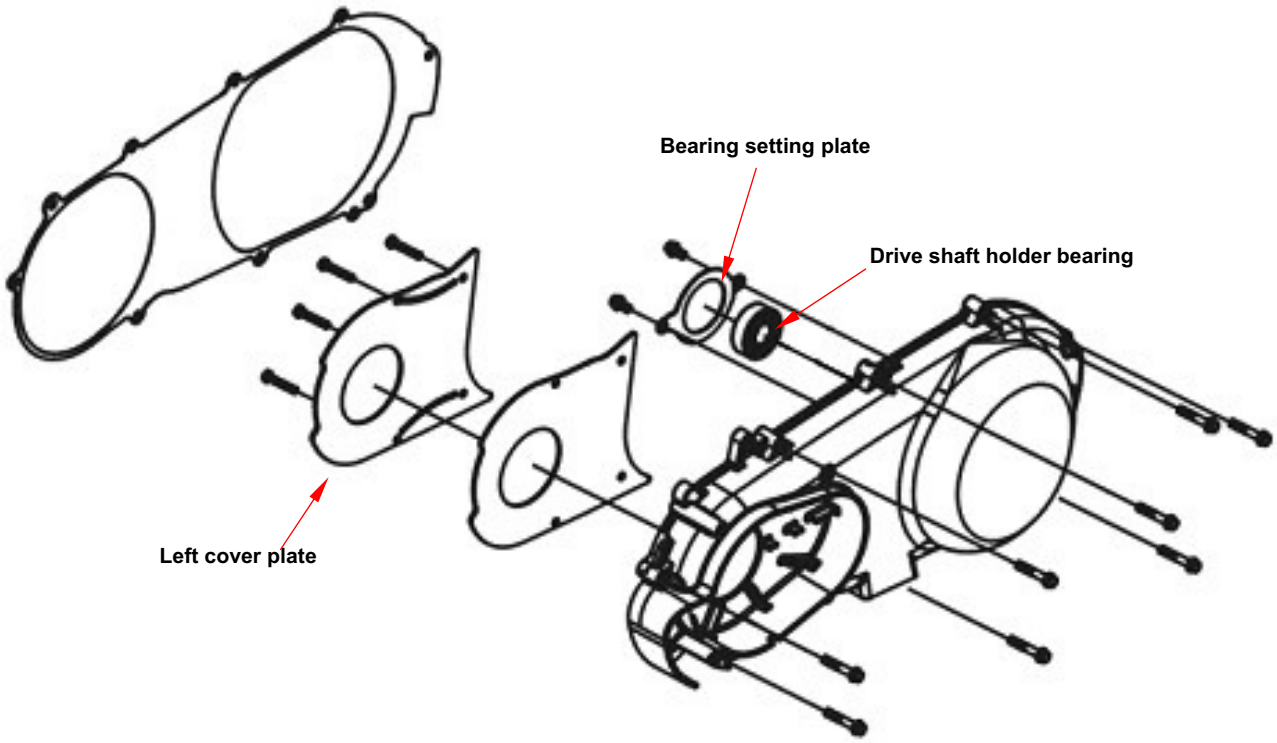
Loosen 4 bolts from left side crank out cover & remove it.
Remove left crankcase cover. (9 bolts)
Remove 2 dowel pin and gasket.



Left crankcase cover install

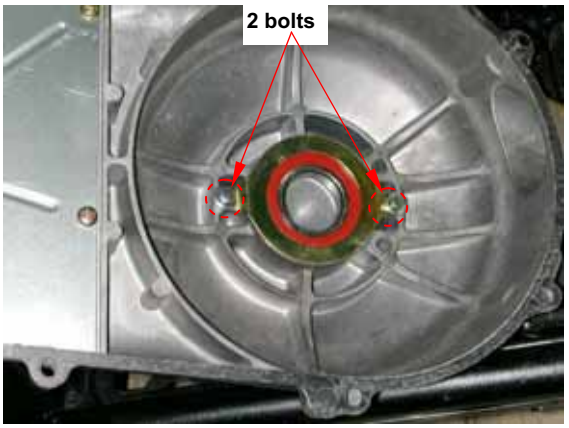
Install left crankcase cover in the reverse procedures of removal.





Left crankcase cover inspection

Remove 2 bolts to remove left crankcase cover bearing setting plate.



Check bearing on left crankcase cover.
Rotate bearing's inner ring with fingers.
Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on cover tightly.
If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.

Bearing replacement

Remove bearing with special service tools

Special tools:

Inner bearing puller SYM-6204022

Install bearing with special service tools.

Special tools:

Right crank case bearing 6201 assembles tool SYM-9614000-HMA 6201

Drive Belt

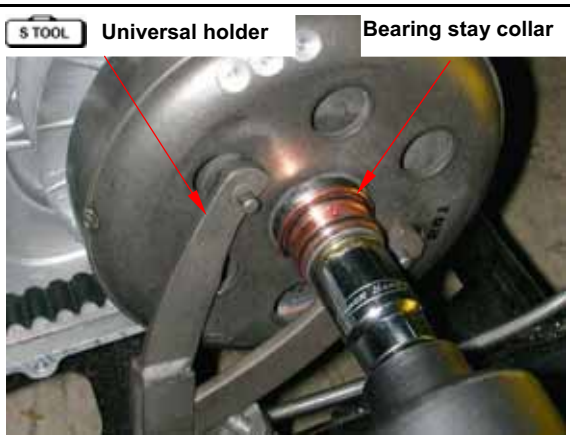
Removal

Remove left crankcase cover.
Hold drive face with universal holder, and remove nut and drive face.
Special Tool：universal holder

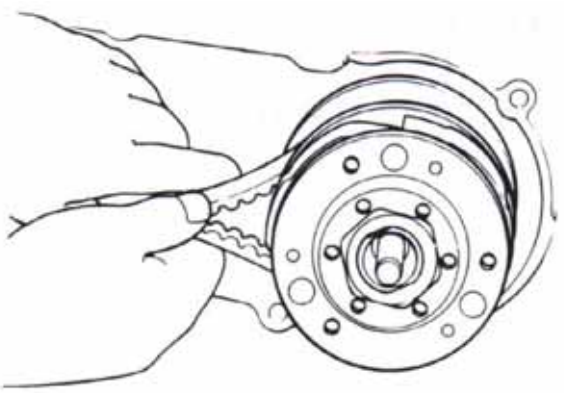
Hold clutch outer with universal holder, and remove nut, bearing stay collar and clutch outer.

⚠ Caution

- Using special service tools for tightening or loosening the nut.
- Fixed rear wheel or rear brake will damage reduction gear system.



Push the drive belt into belt groove as diagram shown so that the belt can be loosened, and then remove the driven pulley.
Remove driven pulley.　Do not remove drive belt.
Remove the drive belt from the groove of driven pulley.

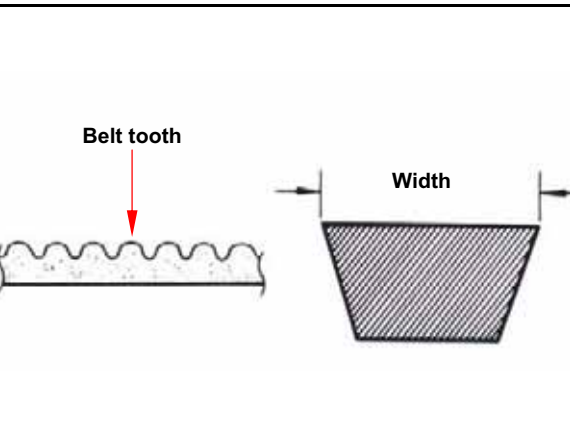


Inspection

Check the drive belt for crack or wear.　Replace it if necessary.
Measure the width of drive belt as diagram shown.
Service Limit: 22.5 mm
Replace the belt if exceeds the service limit.

⚠ Caution

- Using the genuine parts for replacement.
- The surfaces of drive belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.

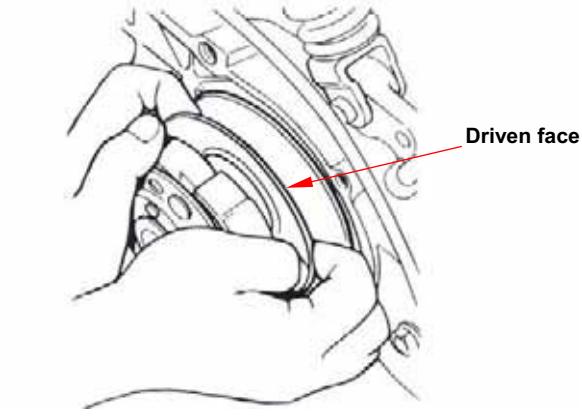


Installation

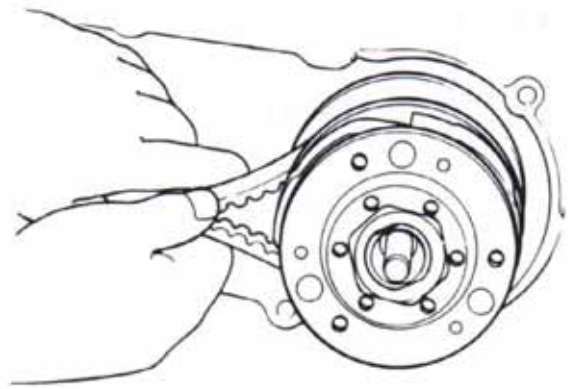
Caution

- Pull out driven face to avoid it closing.
- Cannot oppress friction plate comp in order to avoid creates the distortion or the damage.

Install drive belt onto driven pulley.



Install the driven pulley that has installed the belt onto drive shaft.
On the drive belt another end to the movable drive face.



Install the clutch outer and bearing stay collar.
Hold the clutch outer whit universal holder, and then tighten nut to specified torque value.
Torque value: 5.0~6.0kgf-m

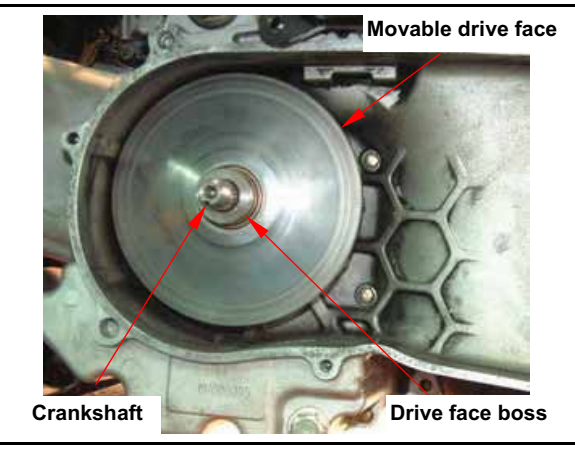
Install the drive face, washer and drive face nut.
Hold drive face with universal holder, and then tighten nut to specified torque value.
Torque value: 8.5~10.5kgf-m

Drive Face

Removal

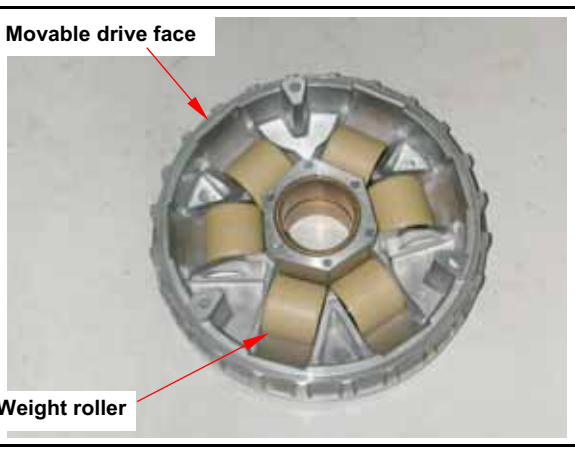
Remove left crankcase cover.
Hold drive face with universal holder, and then remove drive face nut.
Remove drive face and drive belt.

Remove movable drive face comp and drive face boss from crankshaft.



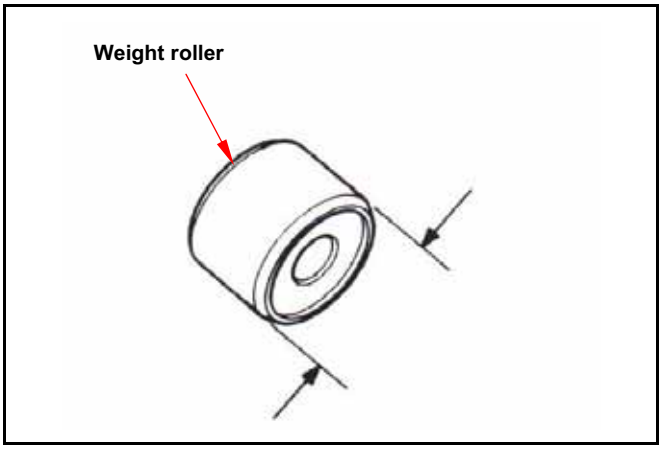
Remove ramp plate.

Remove weight rollers from movable drive face.



Inspection

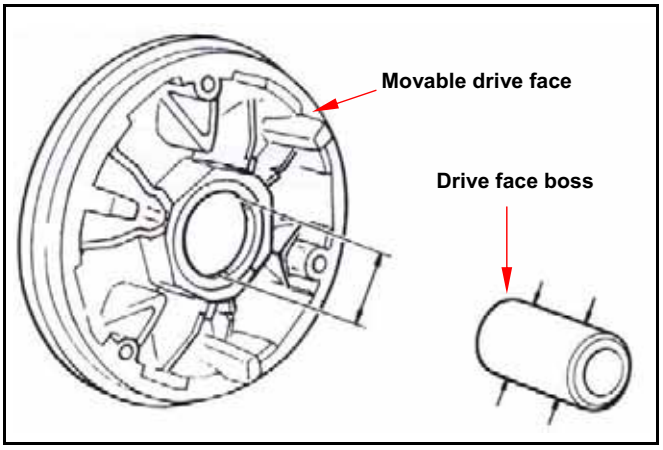
The weight rollers are to press movable drive face by means of centrifuge force.
Thus, if weight rollers are worn out or damaged, the centrifuge force will be affected.
Check if rollers are worn or damaged. Replace it if necessary.
Measure each roller's outer diameter. Replace it if exceed the service limit.
Service limit: 19.0 mm
Weight: 17.2g



Check if drive face boss is worn or damaged and replace it if necessary.

Measure the outer diameter of movable drive face boss, and replace it if it exceed service limit.
Service limit: 29.962 mm

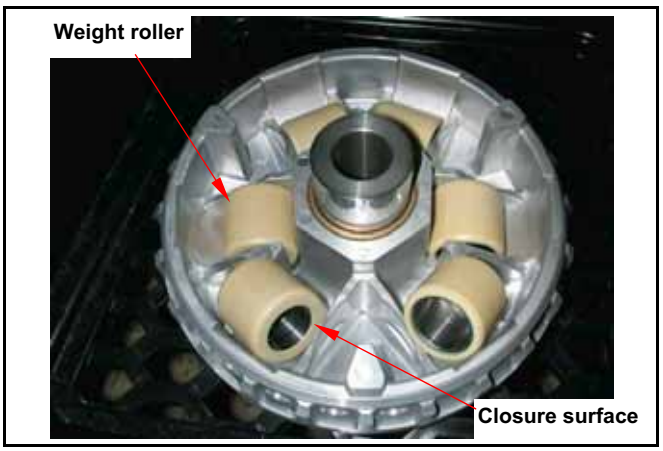
Measure the inner diameter of movable drive face, and replace it if it exceed service limit.
Service limit: 30.060 mm



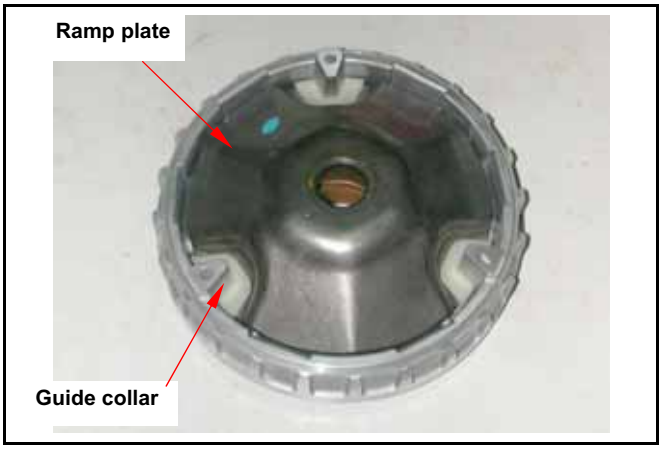
Reassembly/installation
Install weight rollers.

⚠ Caution

- The weight roller two end surfaces are not certainly same. In order to lengthen the roller life and prevented exceptionally wears the occurrence, Please end surface of the closure surface counter clockwise assembles onto movable drive face.



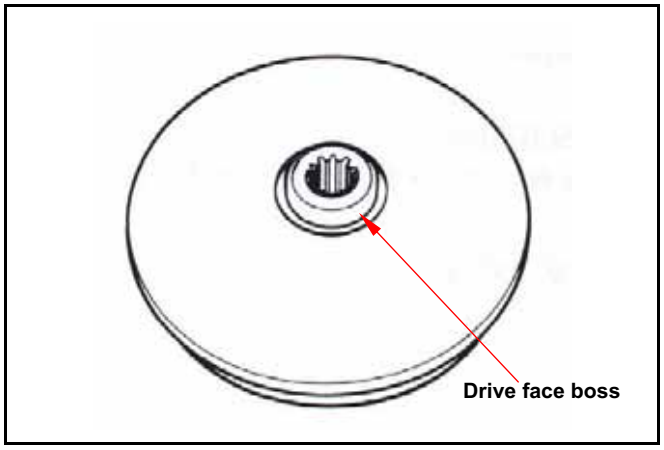
Install ramp plate.



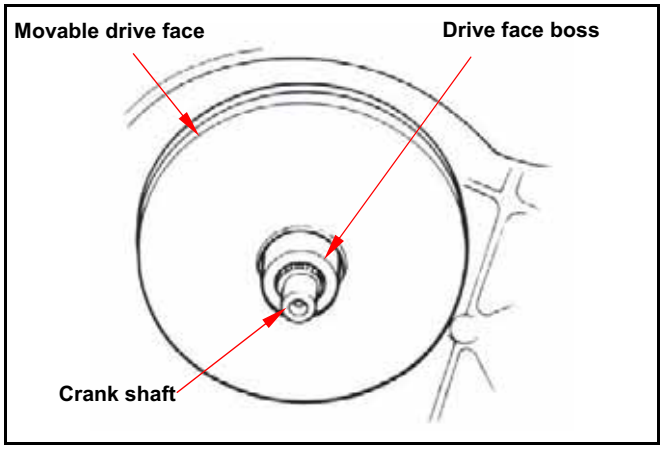
With 4~5g grease spreads wipes drives in the movable drive face axis hole.
Install drive face boss.

Caution

- The movable drive face surface has to be free of grease. Clean it with cleaning solvent.

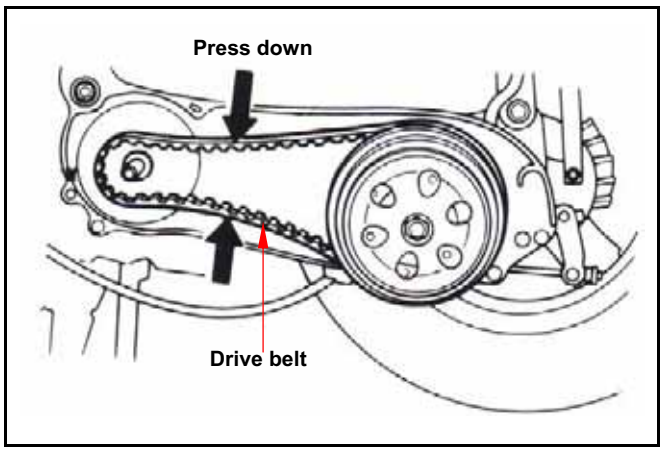


Install movable drive face comp. onto crankshaft.



Driven pulley installation

Press drive belt into pulley groove, and then pull the belt onto drive shaft.



Install drive face, washer and nut.

Caution

- Make sure that two sides of pulley surfaces have to be free of grease. Clean it with cleaning solvent.

Hold drives face with universal holder.
Tighten nut to specified torque.
Torque value: 8.5~10.5kgf-m
Install left crankcase cover.

Clutch Outer/Driven Pulley

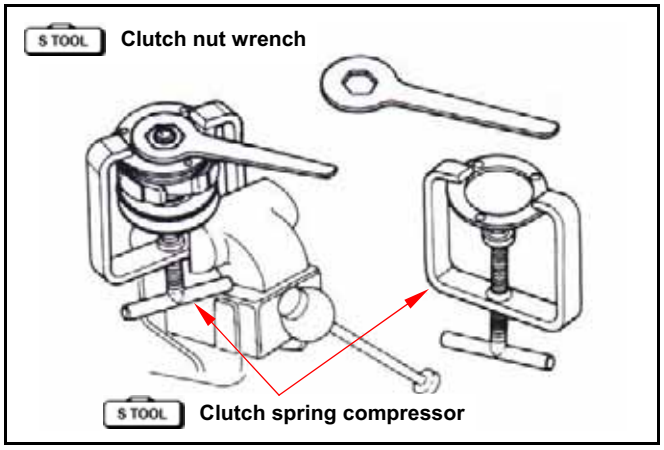
Disassembly

Remove drive belt, clutch outer and driven pulley.
Install clutch spring compressor onto the pulley assembly, and operate the compressor to let the wrench be installed more easily.

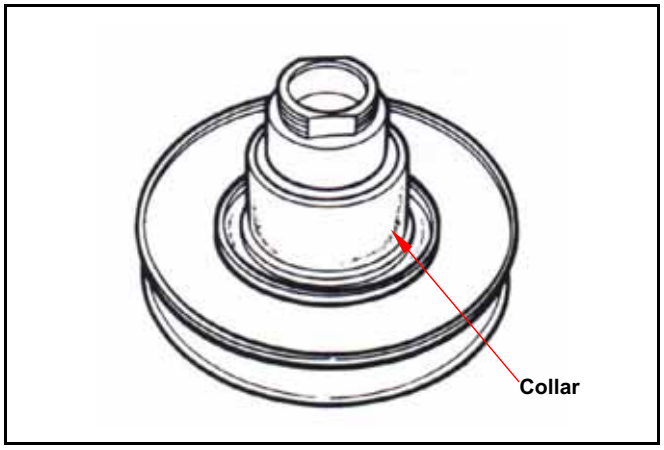
Caution

- Do not press the compressor too much.

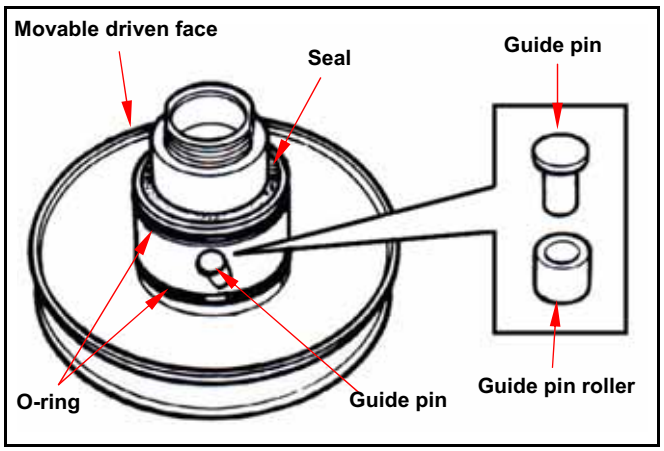
Hold the clutch spring compressor onto bench vise, and then remove mounting nut with special service tool.
Release the clutch spring compressor and remove friction plate, clutch weight and spring from driven pulley.



Remove seal collar from driven pulley.



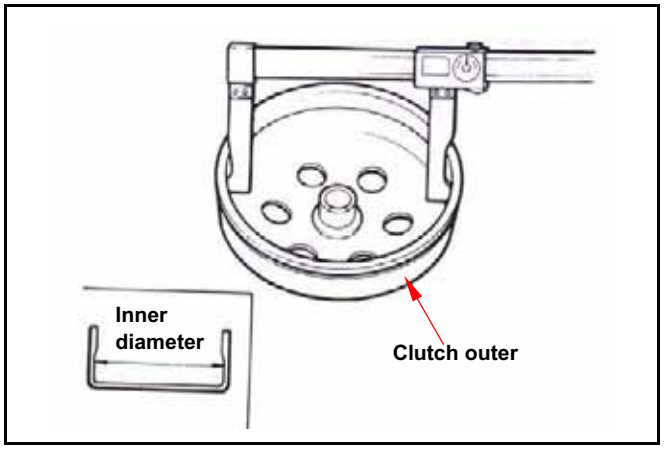
Remove guide pin, guide pin roller, and movable driven face, and then remove O-ring & oil seal seat from movable driven face.



Inspection

Clutch outer

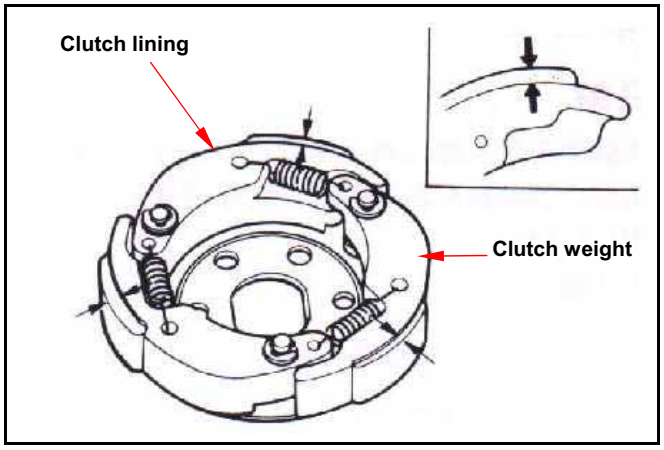
Measure the inner diameter of clutch outer.
Replace the clutch outer if exceed service limit.
Service limit: 145.450 mm



Clutch lining

Measure each clutch weight thickness. Replace it if exceeds service limit.

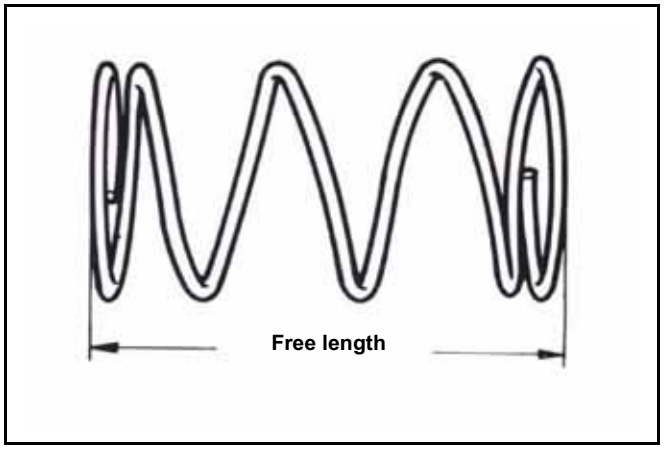
Service limit: 3.0 mm



Driven pulley spring

Measure the length of driven pulley spring. Replace it if exceeds service limit.

Service limit: 97.400 mm



Driven pulley

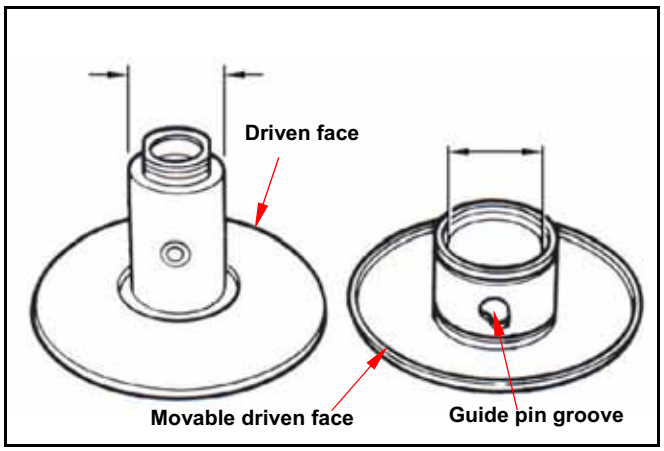
Check following items:

- If both surfaces are damaged or worn.
- If guide pin groove is damaged or worn.

Replace damaged or worn components.

Measure the outer diameter of driven face and the inner diameter of movable driven face. Replace it if exceeds service limit.

Service limit: Outer diameter 40.93 mm
Inner diameter 41.07 mm



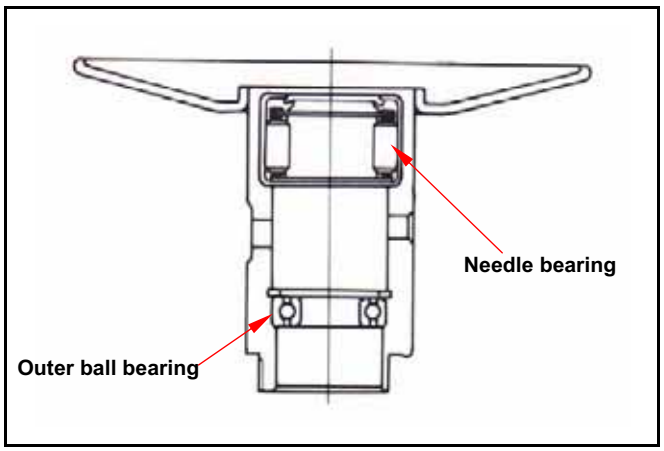
Driven Pulley Bearing Inspection

Check if the inner bearing oil seal is damage. Replace it if necessary.

Check if needle bearing is damage or too big clearance. Replace it if necessary.

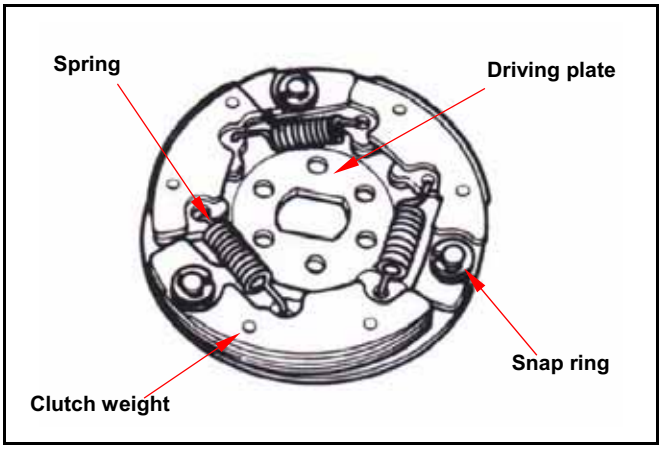
Rotate the inside of inner bearing with fingers to check if the bearing rotation is in smooth and silent.

Check if the bearing outer parts are closed and fixed. Replace it if necessary.



Clutch weight Replacement

Remove snap ring and washer, and then remove clutch weight and spring from driving plate.

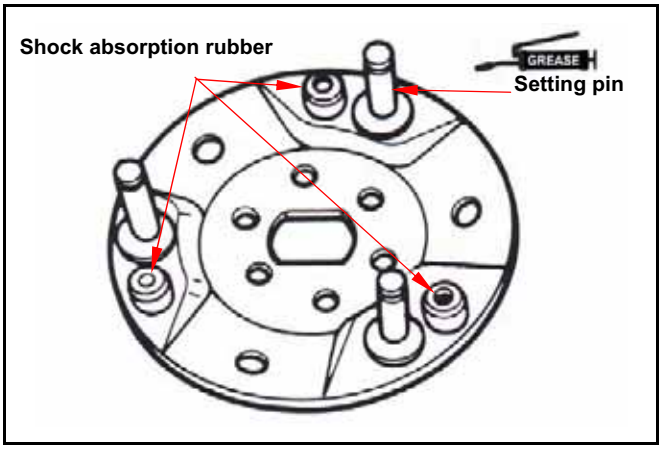


Caution

- Some of models are equipped with one mounting plate instead of 3 snap rings.

Check if spring is damage or insufficient elasticity.

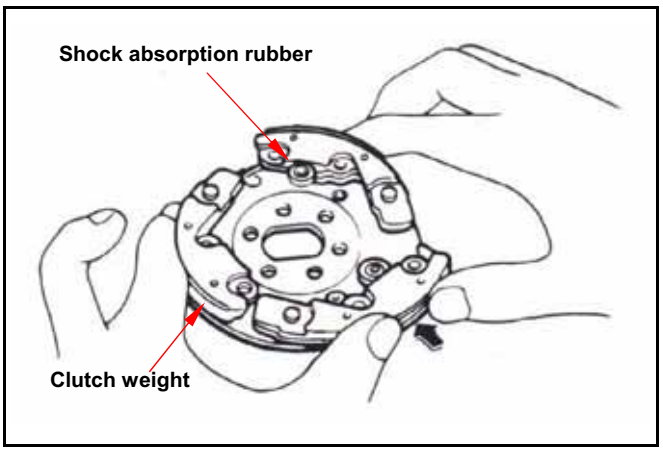
Check if shock absorption rubber is damage or deformation. Replace it if necessary.
Apply with grease onto setting pins.



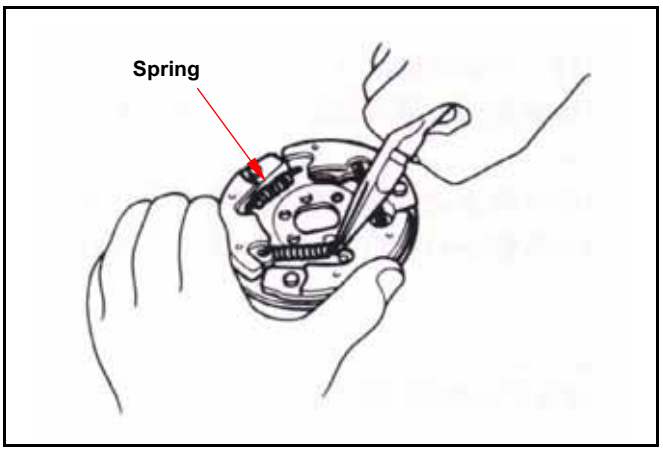
Install new clutch weight onto setting pin and then push to the specified location.
Apply with grease onto setting pins.
But, the clutch block should not be greased. If so, replace it.

Caution

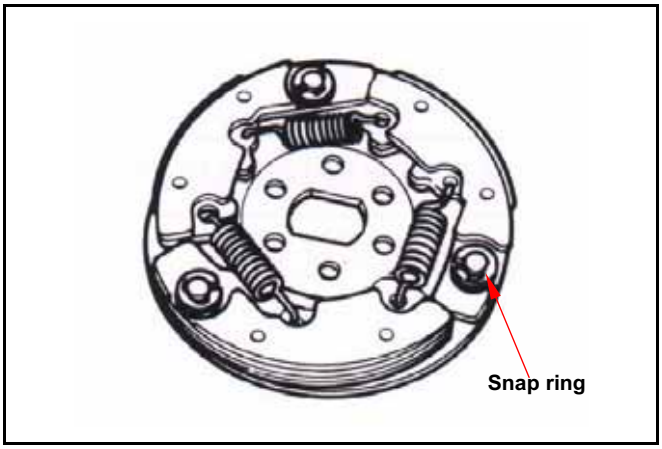
- Grease or lubricant will damage the clutch weight and affect the block's connection capacity.



Install the spring into groove with pliers.



Install snap ring and mounting plate onto setting pin.

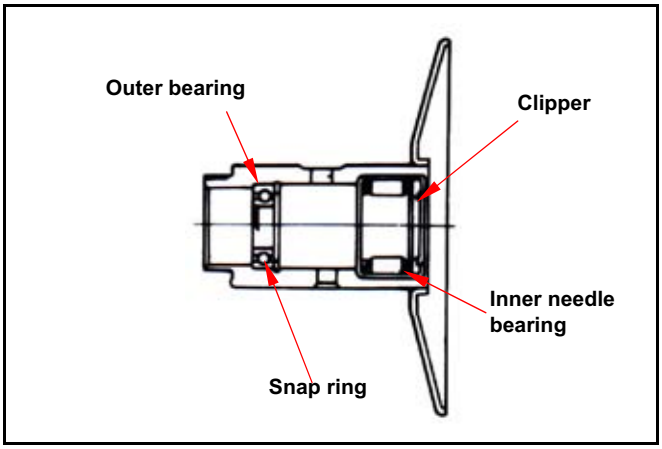


Replacement of Driven Pulley Bearing

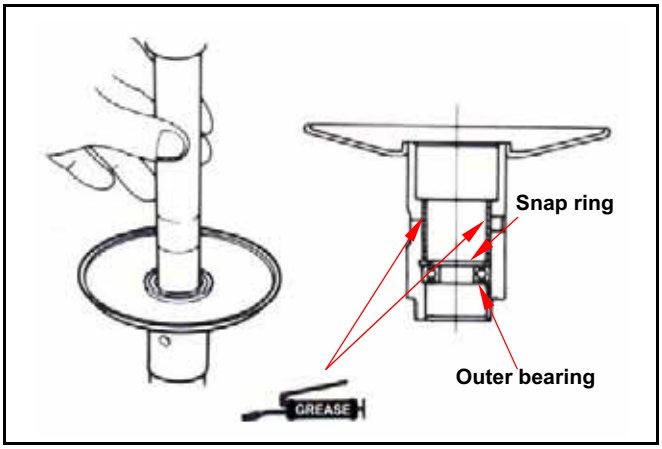
Remove inner bearing.

⚠ Caution

- If the inner bearing equipped with oil seal on side in the driven pulley, then remove the oil seal firstly.
- If the pulley equipped with ball bearing, it has to remove snap ring and then the bearing.



Remove snap ring and then push bearing forward to other side of inner bearing.
Place new bearing onto proper position and its sealing end should be forwarded to outside.
Apply with specified oil.

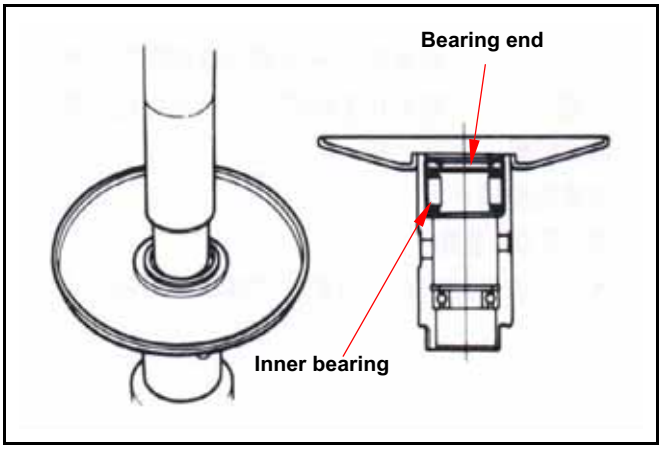


Install new inner bearing.

⚠ Caution

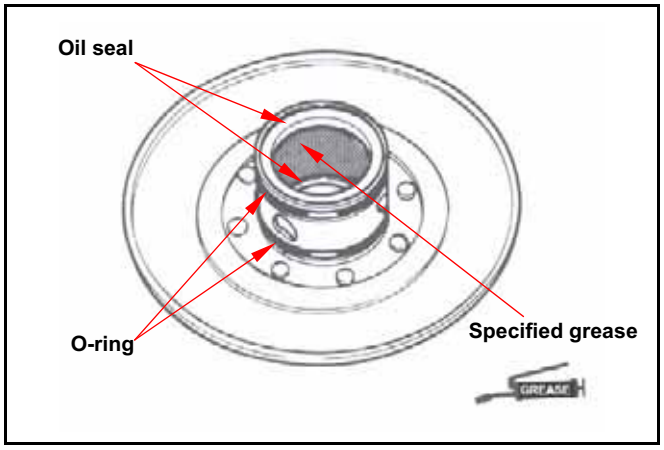
- Its sealing end should be forwarded to outside as bearing installation.
- Install needle bearing with hydraulic presser. Install ball bearing by means of hydraulic presser.

Install snap ring into the groove of drive face.
Align oil seal lip with bearing, and then install the new oil seal (if necessary).

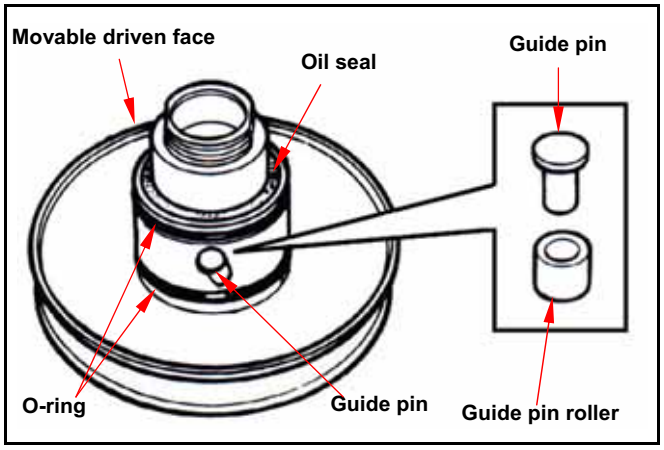


Installation of Clutch Outer/Driven Pulley Assembly

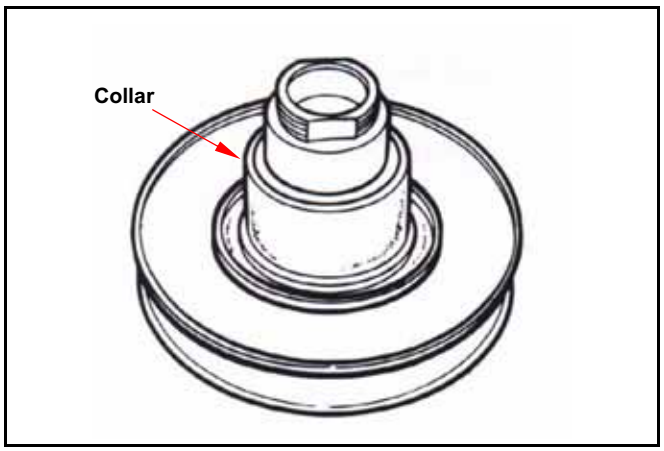
Install new oil seal and O-ring onto movable driven face.
Apply with specified grease to lubricate the inside of movable driven face.



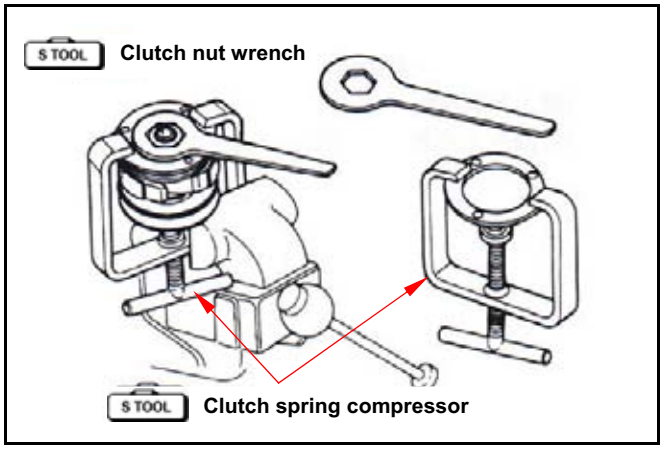
Install the movable driven face onto driven face.
Install the guide pin and guide pin roller.



Install the collar.

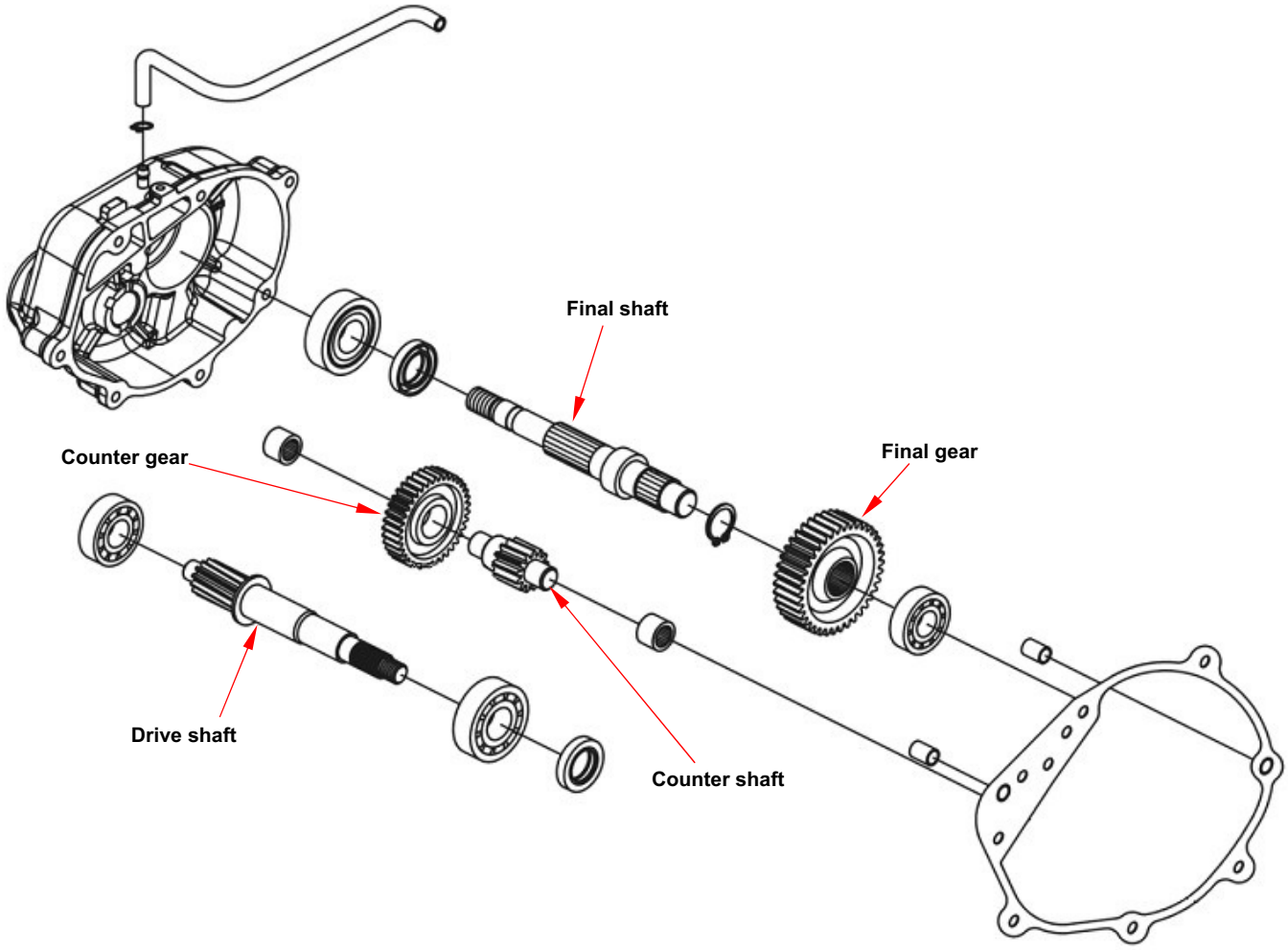


Install friction plate, spring and clutch weight into clutch spring compressor, and press down the assembly by turning manual lever until mounting nut that can be installed.
Hold the compressor by bench vise and tighten the mounting nut to specified torque with clutch nut wrench.
Remove the clutch spring compressor.
Torque value: 5.0~6.0kgf-m
Install clutch outer/driven pulley and drive belt onto drive shaft.



Mechanism Diagram ····· 9-1	Inspection of Final Drive Mechanism····· 9-4
Precautions in Operation ····· 9-2	Bearing Replacement ····· 9-5
Trouble Diagnosis ····· 9-2	Re-Assembly of Final Drive Mechanism····· 9-8
Disassembly of Final Drive Mechanism ··· 9-3	

Mechanism Diagram



Precautions in Operation

Specification

Application oil: scooter gear oil
Recommended oil: KING MATE serial gear oils
Oil quantity: 180 c.c. (170 c.c. when replacing)

Torque value

Gear box cover	2.6~3.0kgf-m

Special tools

Bearing driver	SYM-6204024
Bearing (6205) puller	SYM-9100400 HMA RA1 6205
Drive shaft & oil seal (25*40*8) socket	SYM-9120200-HMA
Bearing (HK1516) driver	SYM-9100200-HMA HK1516
Oil seal drive 34*52*5	SYM-9125500-HMA
Inner bearing puller	SYM-6204022
Outer bearing puller	SYM-6204010
Drive shaft install puller	SYM-2341110- HMA RB1
Bearing install puller	SYM-2341100
Clutch nut wrench	SYM-9020200

Trouble Diagnosis

Engine can be started but motorcycle can not be moved.

- Damaged driving gear
- Burnt out driving gear
- Damaged driving belt.

Noise

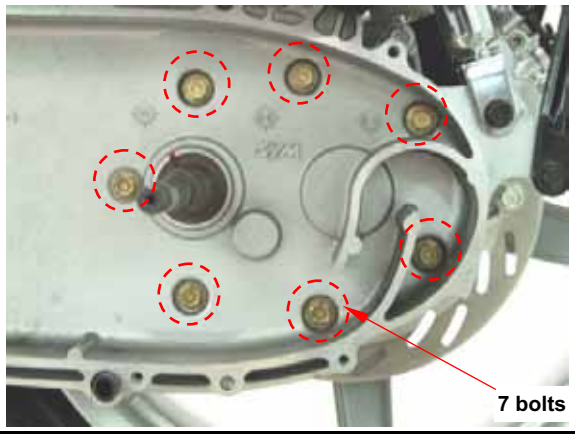
- Worn or burnt gear
- Worn gear

Gear oil leaks

- Excessive gear oil.
- Worn or damage oil seal

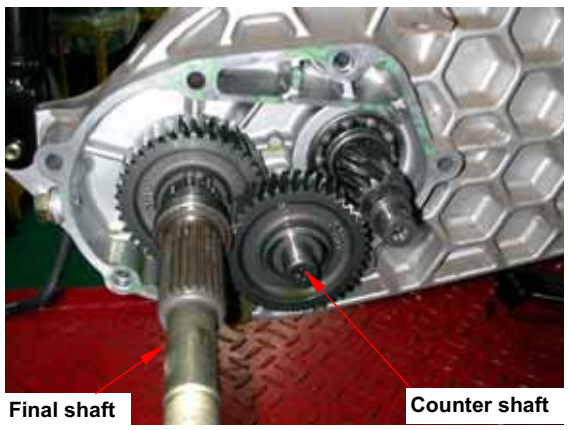
Disassembly of Final Drive Mechanism

Remove the rear wheel.
Remove the clutch.
Drain out gear oil from gear box.
Loosen 7 bolts and remove gear box cover bolts.



Remove the gear box cover.
Remove the gasket & dowel pin.

Remove final gear.
Remove counter shaft, gear and 2 washers.
Remove final shaft.



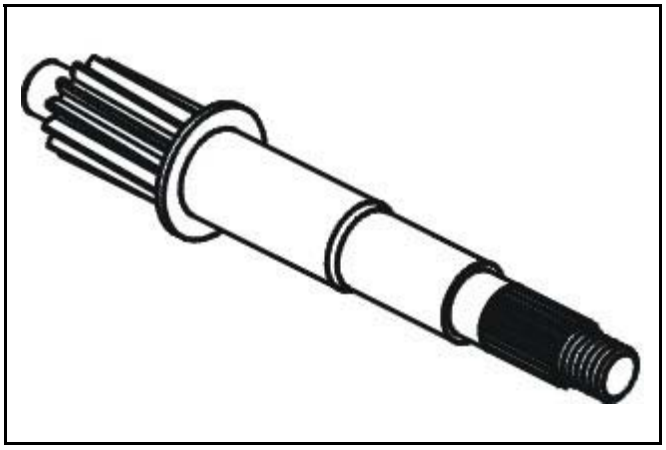
Remove the drive shaft.
Special tool:
Shaft protector

⚠ Caution

- If non- essential do not remove the drive shaft from the cover upper side.
- If remove the drive shaft from the gear box cover, then its bearing has to be replaced.

Inspection of Final Drive Mechanism

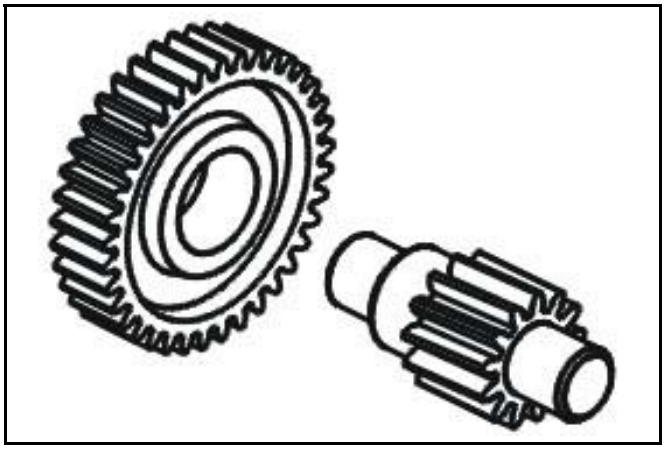
Check if the drive shaft is worn or damaged and replace it if necessary.



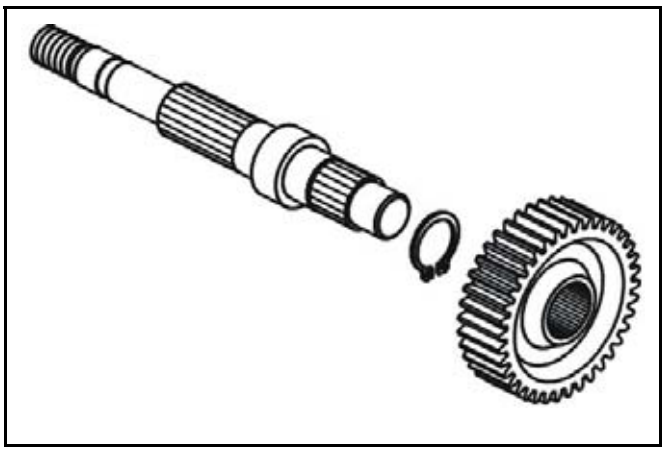
⚠ Caution

- If remove the drive shaft from the gear box upper side, then its bearing has to be replaced.

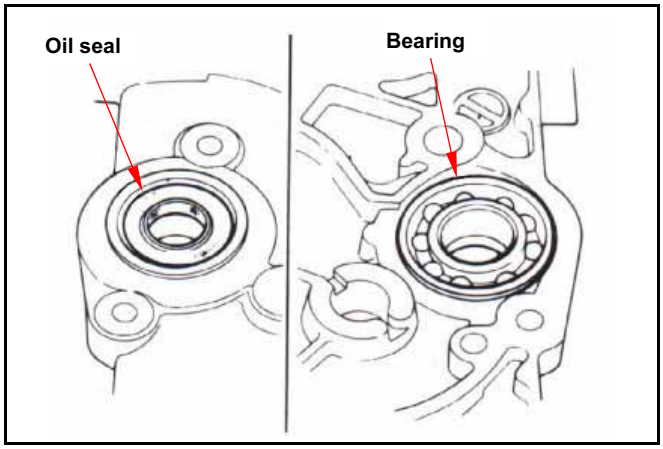
Check if the countershaft is worn or damaged, replace it if necessary.



Check if the final shaft and gear are worn or damaged, replace it if necessary.



Check bearings on gear box cover.
Rotate each bearing's inner ring with fingers.
Check if bearings can be rotated smoothly and silently, and also check if bearing outer ring is mounted on gear tightly.
If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.
Check oil seal for wear or damage, and replace it if necessary.
Check gear box bearing as the same way above, and replace it if necessary.



Bearing Replacement

Left crankcase side

If the drive shaft is pulled out with its bearing, then remove the bearing with bearing puller and shaft protector.

Special tool:

Multi-functional bearing puller or Outer bearing puller SYM-6204001

Shaft protector SYM-6204010

Remove final shaft bearing and counter shaft bearing from left crankcase using following tools.

Special tool:

Inner bearing puller SYM-620422

⚠ Caution

- Never install used bearings. Once bearing removed, it has to be replaced with new one.

Install new final shaft bearing and counter shaft bearing into left crankcase.

Special tool:

Bearing driver SYM-6204024

Bearing driver HK1516 SYM-9100200-HK1516

Install new drive shaft bearing and bearing puller onto left crankcase.

Special tool:

Bearing puller 6205 SYM-9100400-6205

Install assembly directs puller bearing puller.
Special Service Tools:
Assembly directs puller SYM-2341110

Use screw driver hold bearing puller lower part, and turn the bearing puller upper part to install the drive shaft bearing.

Gear box cover side

Remove drive shaft bearing and counter shaft bearing from gear box cover using following tools.
Special tool:
Inner bearing puller SYM-6204020 or SYM-6204021

Remove oil seal, and then remove final shaft bearing from gear box cover using following tools.
Special tool:
Inner bearing puller SYM-6204022

Install a new drive shaft bearing and counter shaft bearing into gear box cover.

Install new final shaft bearing and bearing puller onto left crankcase.
Special tool:
Bearing puller 6205 SYM-9100400-6205

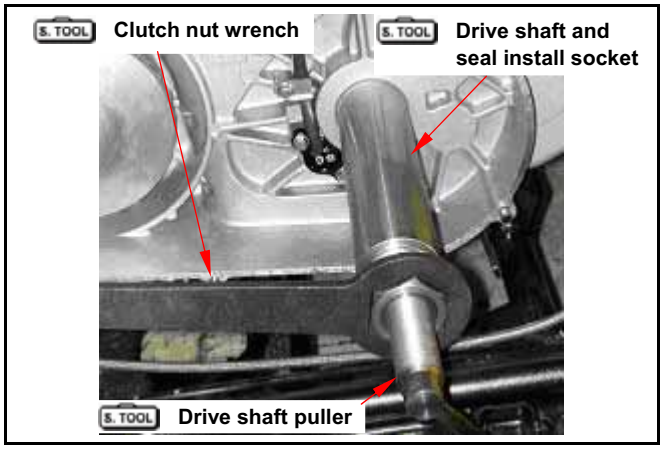
Install assembly directs puller bearing puller.
Special Service Tools:
Assembly directs puller SYM-2341110

Use screw driver holder bearing puller lower part, and turn the bearing puller upper part to install the final shaft bearing.

Apply with grease onto final shaft oil seal.
Install the oil seal into gear box cover.
Special tool:
Oil seal driver 34*52*5 SYM-9125500-HMA

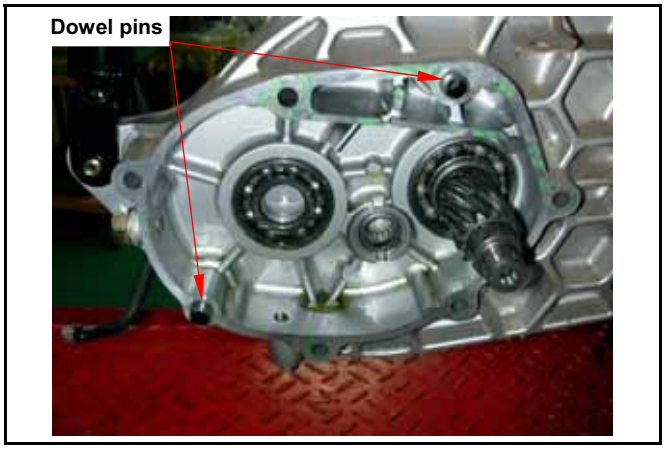
Re-Assembly of Final Drive Mechanism

Install drive shaft.
Special tool:
Drive shaft puller SYM-2341110- HMA RB1
Drive shaft socket & oil seal driver (25*40*8) SYM-9120200-HMA
Clutch nut wrench SYM-9020200

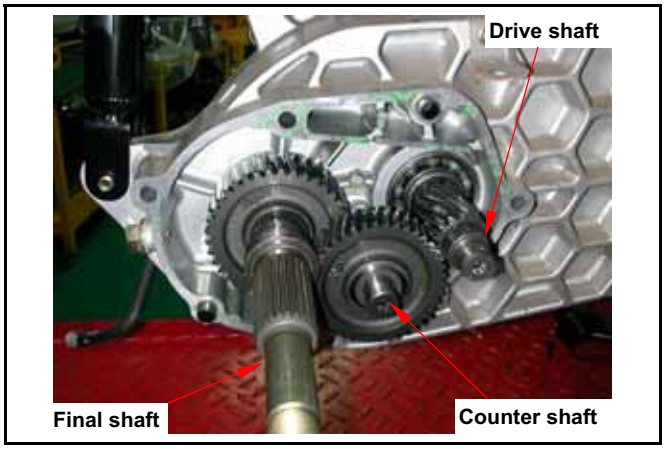


Apply with grease onto drive shaft oil seal.
Install the oil seal to left crankcase.
Special tool:
Drive shaft socket & oil seal driver (25*40*8) SYM-9120200-HMA

Install 2 dowel pins & new gasket.



Install counter shaft and final shaft into the gear box cover.
Install the gear box and tighten the bolts (7 bolts).
Torque value: 2.6~3.0kgf-m
Install driven pulley / clutch outer / belt.
Install movable drive face, drive face and left crankcase cover.
Install rear wheel.
Add gear oil.
Gear oil quantity: 180c.c.



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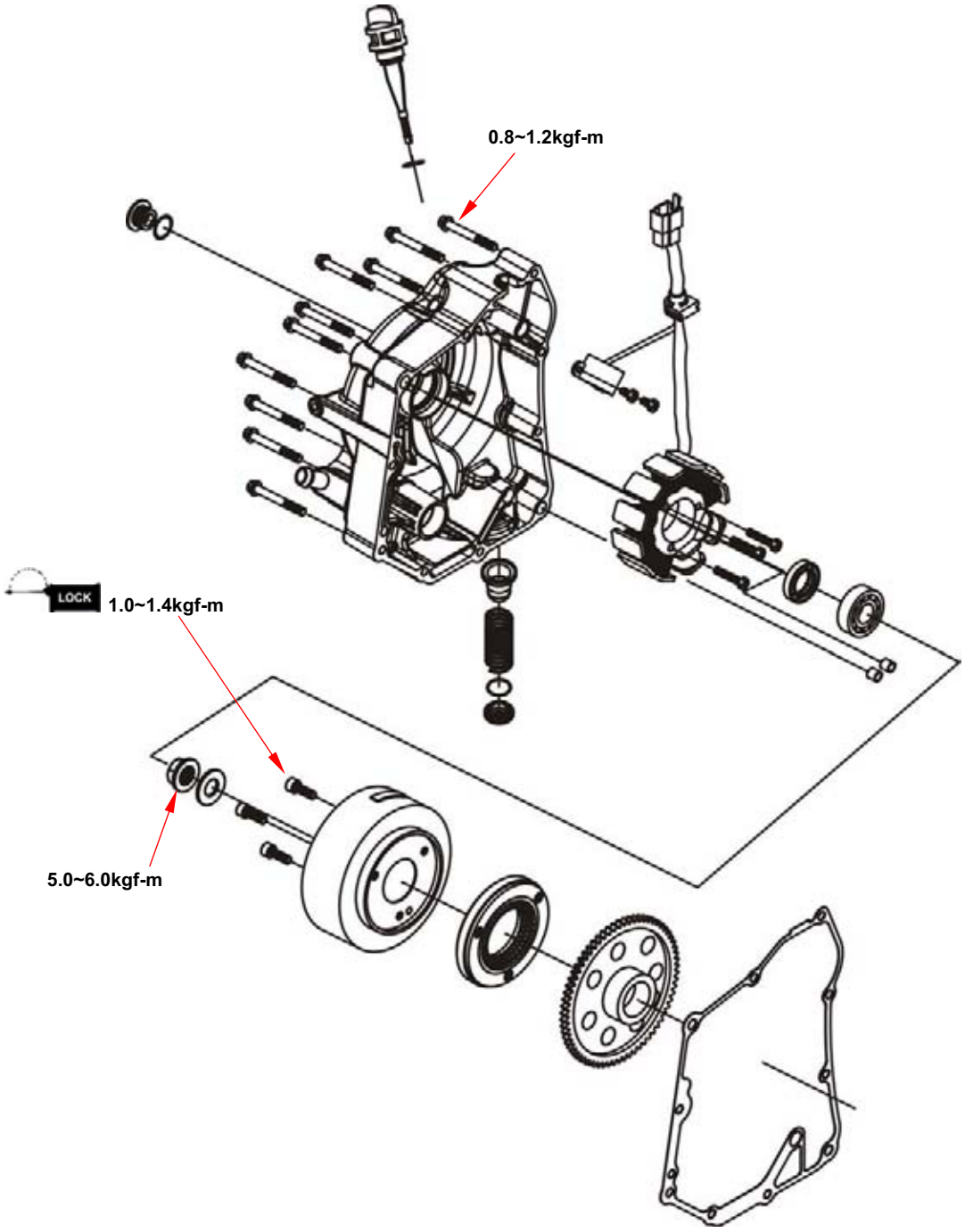
Mechanism Diagram



Precautions in Operation

General information

- Refer to chapter 17: The troubleshooting and inspection of alternator.
- Refer to chapter 17: The service procedures and precaution items of starter motor.

Specification

Item	Standard value (mm)	Limit (mm)
ID of starting clutch gear	25.026~25.045	25.050
OD of starting clutch gear	42.192~42.208	42.100

Torque value

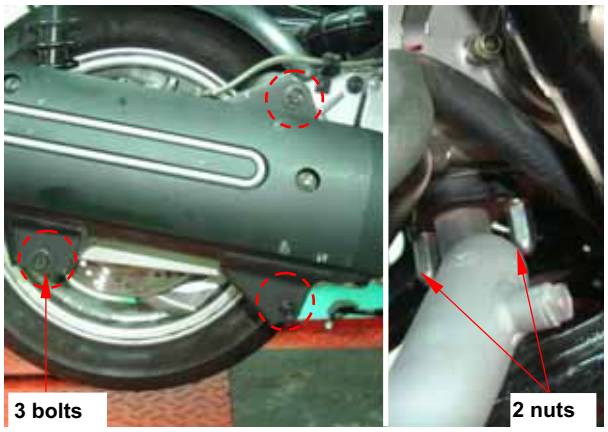
Flywheel nut	5.0~6.0kgf-m
Starting clutch hexagon bolt	1.0~1.4kgf-m with adhesive
8 mm bolts	0.8~1.2kgf-m
12 mm bolts	1.8~2.2kgf-m

Special tools

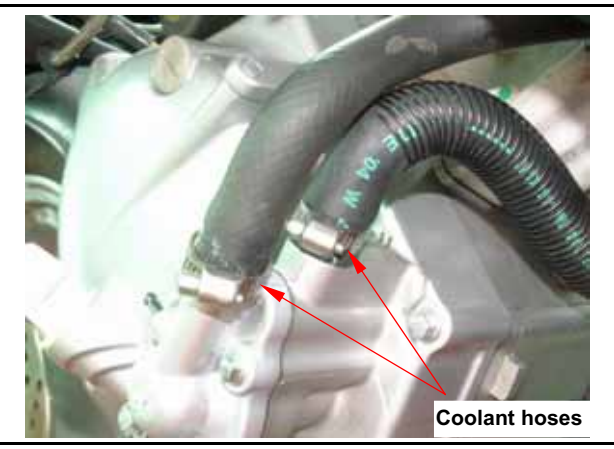
AC.G. flywheel puller	SYM-3110000-HMA
Left crank case cover 6201 bearing puller	SYM-9614000-HMA RB1 6201
Inner bearing puller	SYM-6204025
Universal holder	SYM-2210100

Right Crankcase Cover Removal

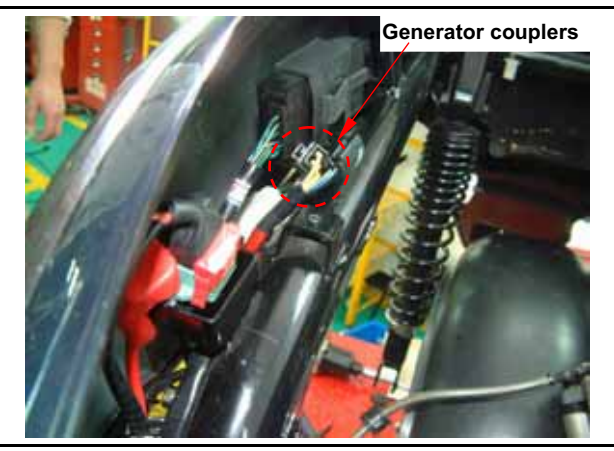
Remove right side cover.
Remove seat and luggage box.
(Refer chapter 13)
Remove the exhaust muffler (3 bolts, 2 nuts).



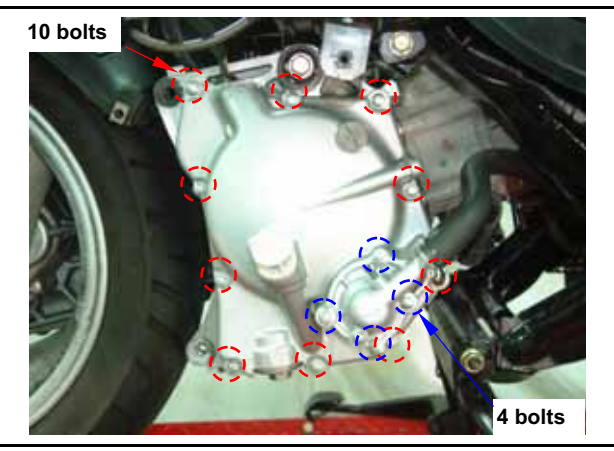
Drain out the engine oil and coolant (refer chapter 5).
Remove coolant hoses.



Disconnect the couplers of the power source output line.

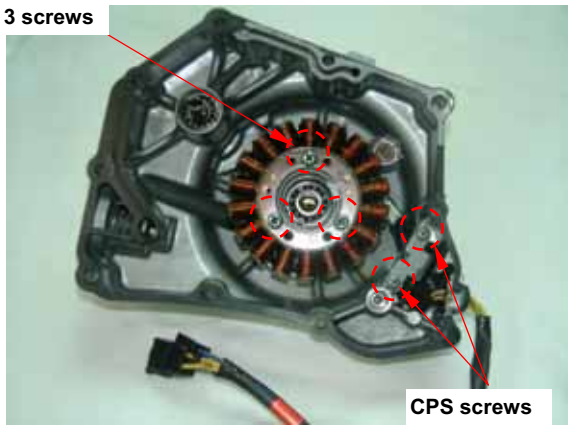


Remove water pump cover (4 bolts).
Remove 10 bolts from the right crankcase cover.
Remove the right crankcase cover.
Remove dowel pin and gasket.



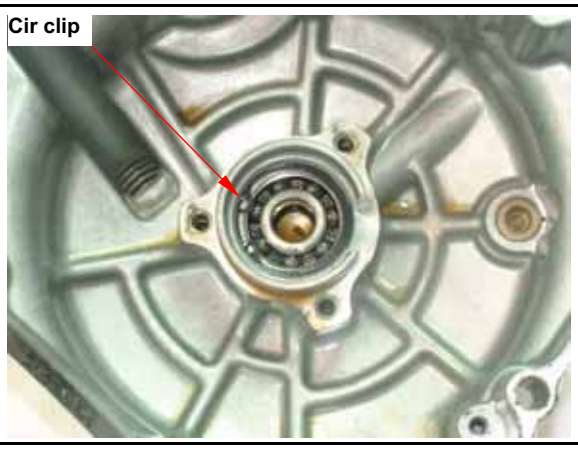
AC Generator Removal

Remove 2 mounting screws from CPS.
Remove 3 screws from right crankcase cover and then remove generator coil set.

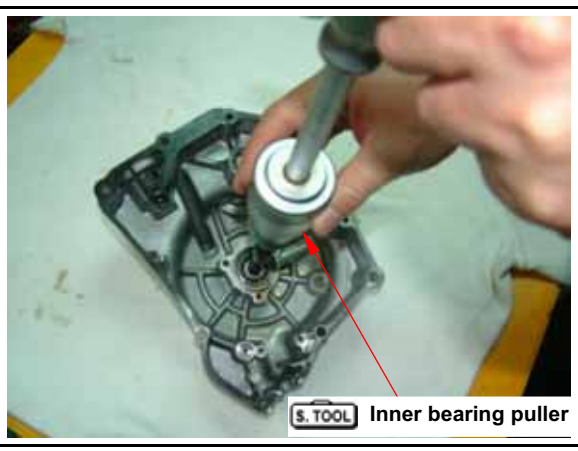


Right Cover Bearing

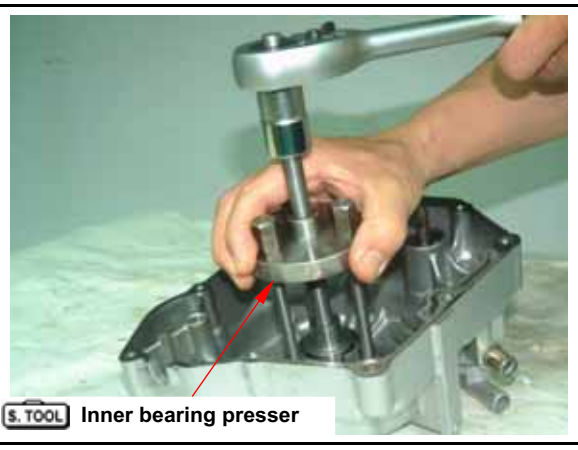
Rotate the bearing by fingers to check if the bearing rotation is smooth and silent.
Check if the bearing outer parts are closed and fixed, replace it if necessary.



Remove the bearing 6201 with inner bearing puller.
Special tool:
Inner bearing puller SYM-6204025

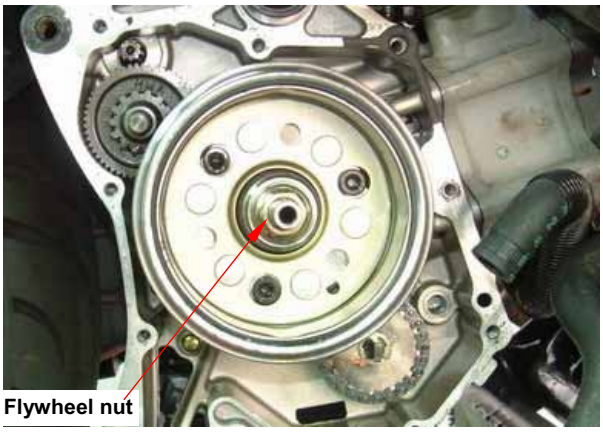


Install the bearing 6201 bearing with special tool.
Special tool:
Right crankcase cover bearing 6201 presser
SYM-9614000-HMA RB1 6201

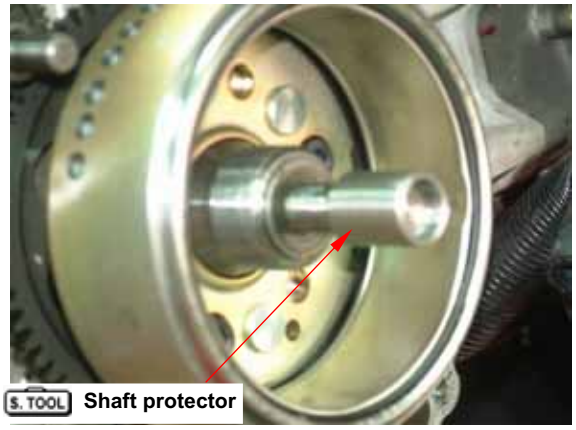


Flywheel Removal

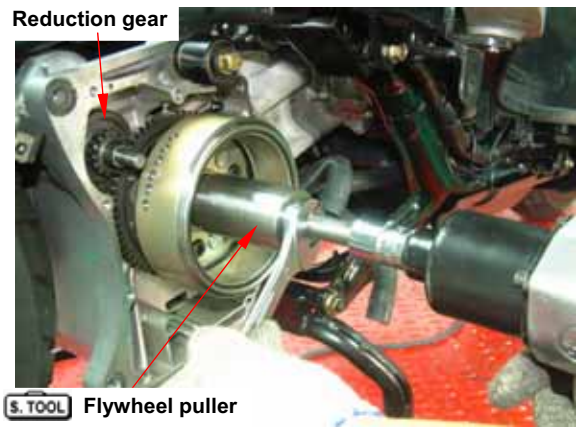
Remove right crankcase cover and generator coil.
Remove flywheel nut.



Install shaft protector onto the crank shaft.
Special tool:
Shaft protector



Remove starter reduction gear and shaft.
Pull out flywheel with AC generator flywheel puller.
Special tool:
Flywheel puller SYM-3110000-HMA

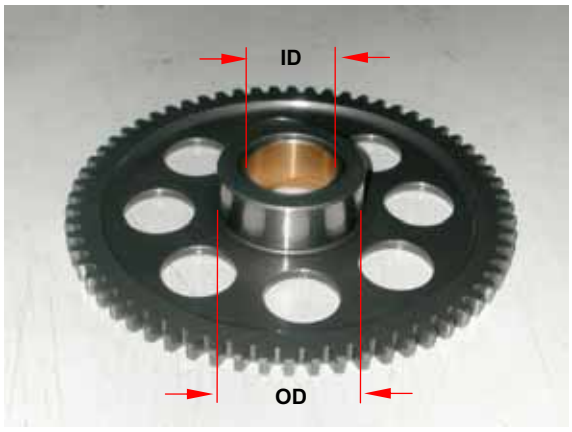


Remove flywheel and starting driven gear.

Starting Clutch

Starting Clutch Inspection

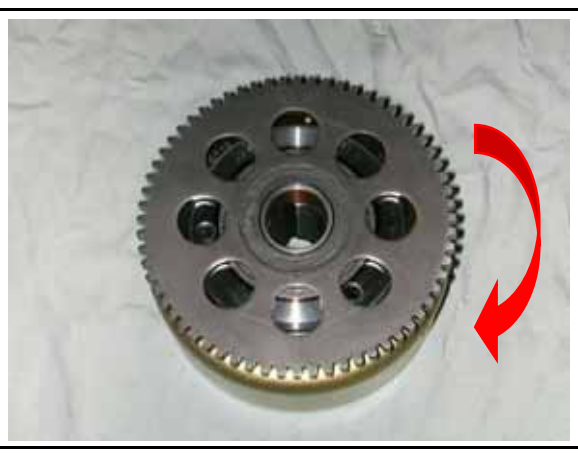
Remove starting clutch driven gear.
Check the gear for wear or damage.
Measure the ID and OD of the starting clutch driven gear.
Service Limit: ID: 25.050 mm
OD: 42.100 mm



Check the starting reduction gear and shaft for wear or damage.

Check each roller for wear or damage.

Install starting clutch driven gear onto one way clutch.
Hold flywheel and rotate starting clutch gear.
The starting clutch gear should be rotated in counterclockwise direction freely, but not clockwise direction.



Remove the starting gear
Loosen 3 starting clutch socket bolts from one way clutch and remove one way clutch.

Push out the roller set and check each roller for wear or damage.

One way clutch Installation

Install the components in the reverse procedures of removal.

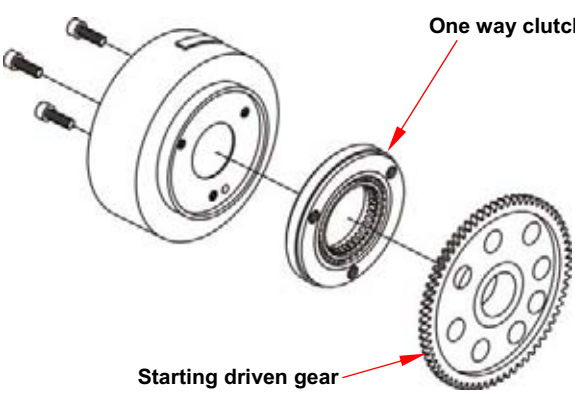
Torque value: 1.0~1.4kgf-m

⚠ Caution

- Cannot lock the thread of socket bolt.

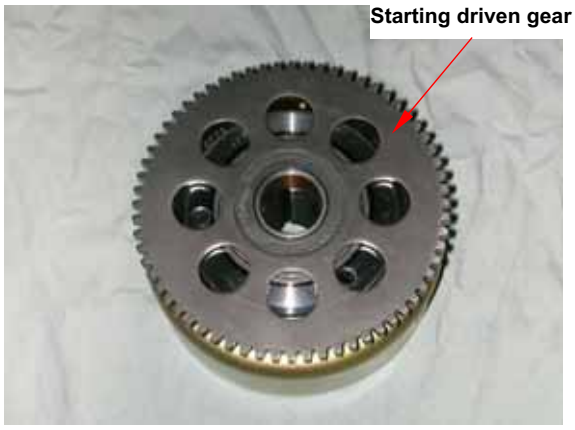
⚠ Caution

- The one way clutch must to with the generator flywheel and the starter gear, after one and loads the crank in, only then may lock the socket bolt, otherwise will create concentric the deviation, will cause the part to suffer injury.



Flywheel Installation

Install starting driven gear onto one way clutch.



Align the key on crankshaft with the flywheel groove, and then install the flywheel.

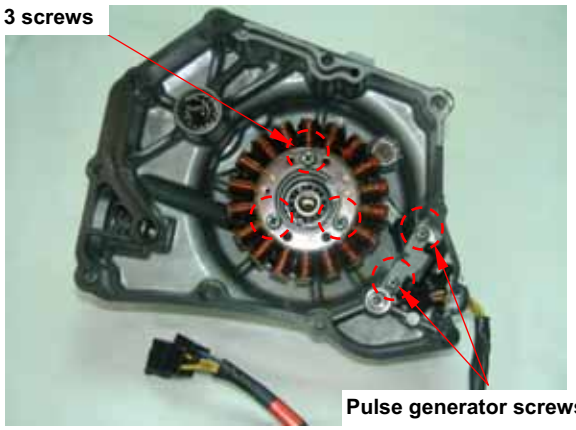
Hold the flywheel by drive face with universal holder, and tighten flywheel nut.
Torque value: 5.0~6.0kgf-m
Special tool:
Universal Holder SYM-2210100

AC Generator Installation

Install the AC Generator coil onto right crankcase cover (3 screws).
Install the CPS (2 screws).
Tie the wire harness securely onto the indent of crankcase.

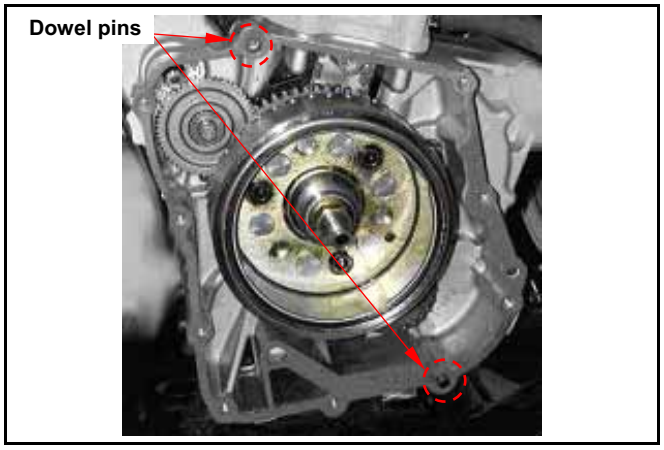
Caution

- Make sure that the wire harness is placed under pulse generator.

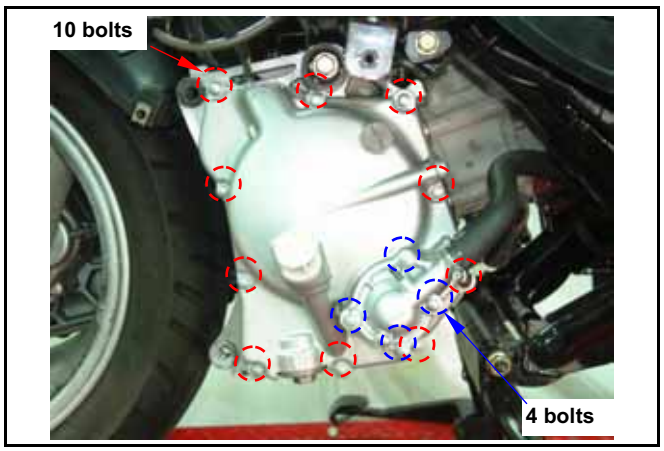


Right Crankcase Cover Installation

Install dowel pins and new gasket.
Remove water pump cover.
Install right crankcase cover onto the crankcase.
Note: Align the water pump shaft indent with the oil pump shaft.



Install right crankcase cover (10 screws).
Install the dowel pin, new gasket and water pump cover onto crankcase cover.



Connect coolant hoses onto the right crankcase cover.
Add engine oil and coolant.

Notes:

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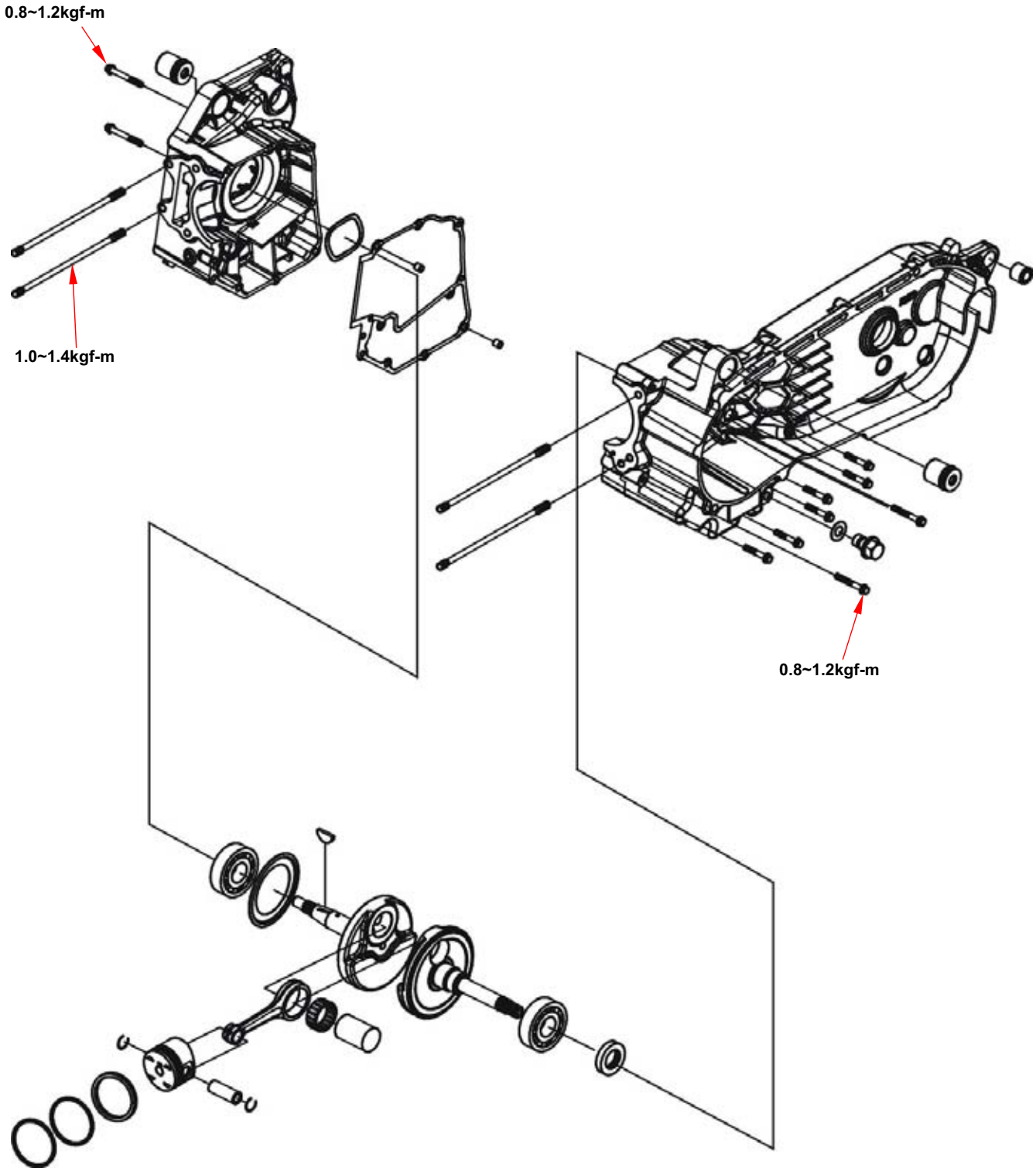
General Information ·····11-2	Crankshaft Inspection ····· 11-4
Trouble Diagnosis ·····11-2	Crankcase Reassembly ····· 11-6

Mechanism Diagram



General Information

Operational precautions

- This Section concerns disassembly of the crankcase for repair purpose.
- Remove following components before disassembling crankcase.
  - —Engine remove Chapter 5
  - —Cylinder head Chapter 6
  - —Cylinder and piston Chapter 7
  - —Drive face and driven pulley Chapter 8
  - —AC generator/Start one way clutch Chapter 10
- In case it requires replacing the crankshaft bearing, the driving chain of engine oil pump or the timing chain, it is preferably to replace crankshaft as a unit.

Specification

Unit: mm

Item	Standard	Limit
Connecting rod side clearance of the big end	0.100~0.400	0.600
Vertical clearance of the big end of the connecting rod	0~0.008	0.050
Run-out	-	0.100

Torque value

Bolts for crankcase	0.8~1.2kgf-m
Cylinder stud bolts	1.0~1.4kgf-m
Bolt for cam chain adjuster	1.2~1.6kgf-m

Special tools

R/L. crank disassemble tool	SYM-1120000-HMA H9A
L. crank shaft bearing puller	SYM-9100100
Crank shaft install socket & oil seal driver	SYM-2341110- HMA RB1
Crank shaft puller	SYM-1130000-HMA H9A
Outer bearing puller	SYM-6204010
Inner bearing puller	SYM-6204025
Clutch nut wrench	SYM-9020200

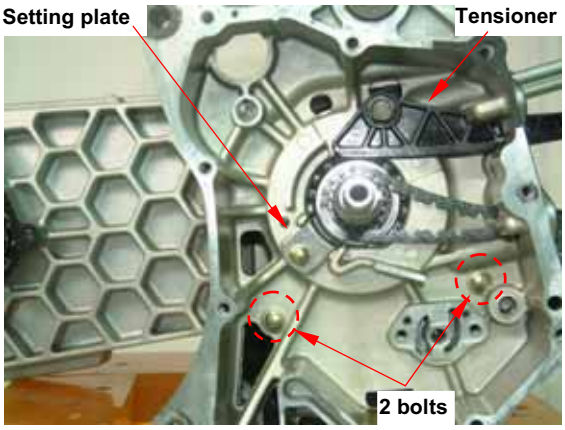
Trouble Diagnosis

Engine noise

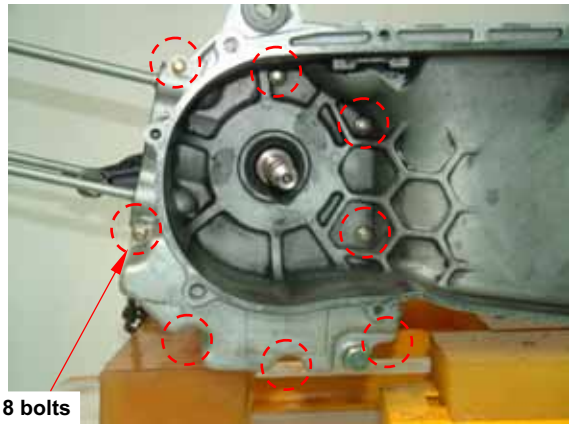
- Loose crankshaft bearing
- Loose crankshaft pin bearing
- Worn out piston pin and pin hole

Crankcase Disassembly

Remove the cam chain setting plate, and then remove cam chain.
Loosen the pivot bolt and remove the cam chain tensioner.
Loosen 2 bolts on the right crankcase.



Loosen 8 bolts on the left crankcase.



Place right crankcase downward and left crankcase upward.
Install crankshaft disassemble tool onto left crankcase.

⚠ Caution

- Care should be taken not to damage the contact surfaces.

Install left crank shaft puller into crank case disassemble.
Hold left crank shaft puller nut by clutch nut wrench, and turn the shaft puller to press out crank shaft from left crankcase.

Special tool:
Crank case disassemble
SYM-1120000-HMA H9A
L. Crank shaft puller
SYM-1130000-HMA H9A
Clutch nut wrench SYM-9020200

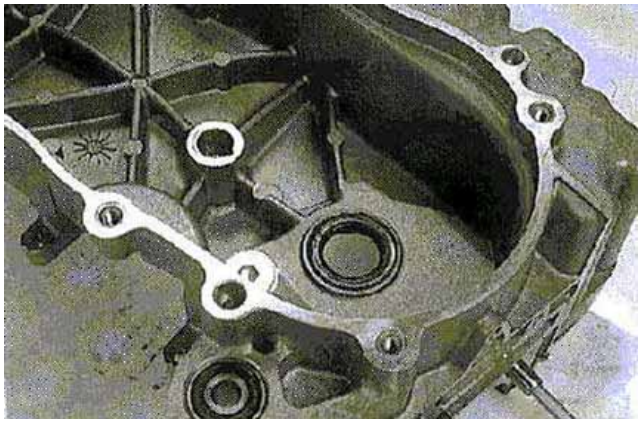
Remove crankshaft and wave washer from right crankcase.

Remove gasket and dowel pins.
Scrape gasket residues off the crankcase contact surface.

⚠ Caution

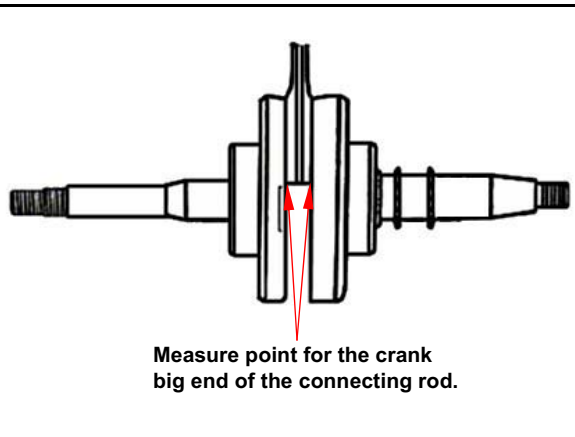
- Do not damage contact surface of the gasket.
- It is better to moisten the gasket residue for easy scrapping.

Drive out left crankcase oil seal.

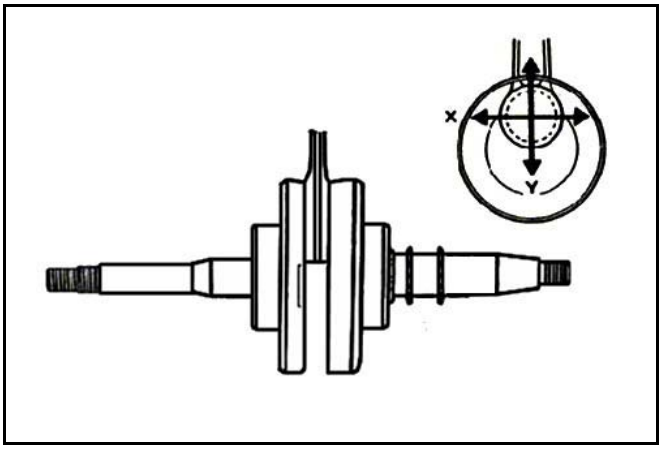


Crankshaft Inspection

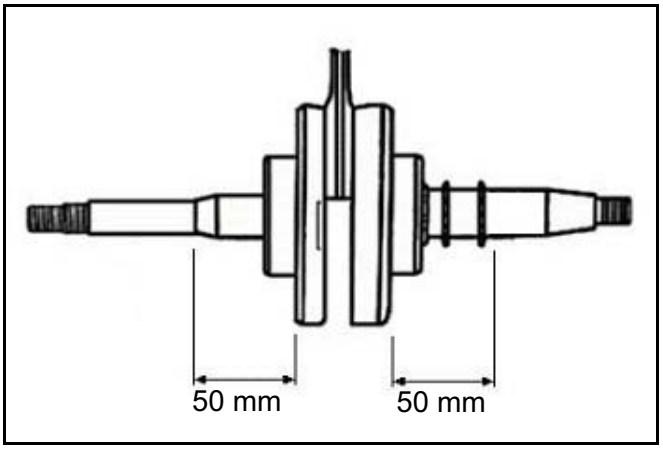
Use a thickness gauge to measure left and right clearance of connecting rod big end.
Service limit: 0.6 mm



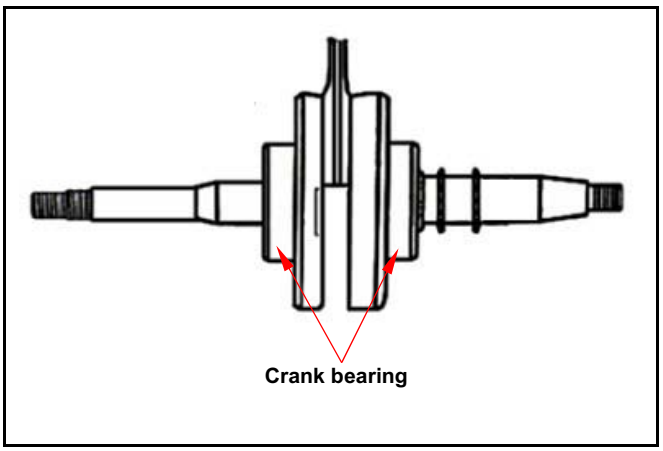
Measure the clearance of the big end at the vertical directions.
Service limit: 0.05 mm



Place the crankshaft on a V-block, measure run-out of the crankshaft.
Service limit: 0.10 mm



Check crankshaft bearing
Use hand to crank the bearing to see it moves freely, smoothly and noiseless.
Check the inner ring to see it links firmly on the bearing.

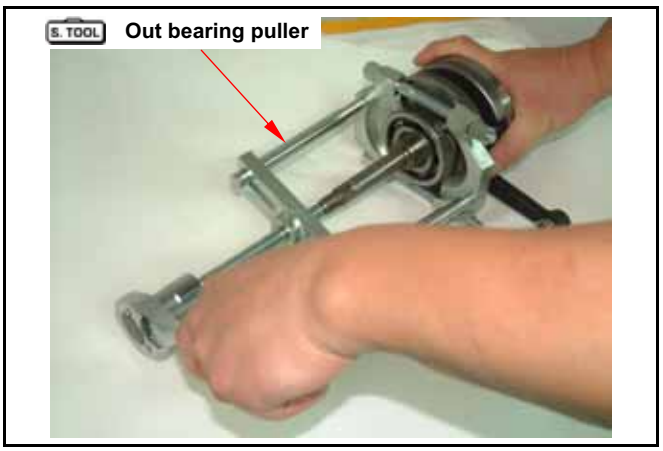


If any roughness, noise and loose linkage are detected, replace the bearing with new one.

Caution

- The bearing shall be replaced in pair.

Special tool:
Outer bearing puller SYM-6204010



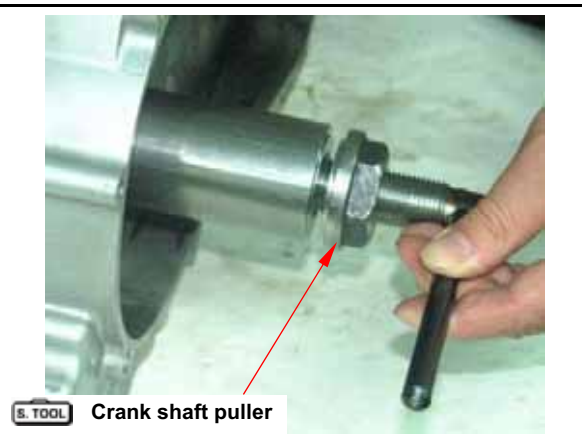
Crankcase Reassembly

Install new bearing and bearing puller onto left crankcase bearing hole.
Special tool:
L. crank shaft bearing puller SYM-9100100

Install crank disassemble tool onto left crankcase.
Install left crank shaft puller into crank case disassemble.
Hold left crank shaft puller, and turn the shaft puller nut by clutch nut wrench to pull in crank shaft bearing into left crankcase.
Special tool:
Crank case disassemble SYM-1120000-HMA H9A
L. Crank shaft puller SYM-2341110-HMA
Clutch nut wrench SYM-9020200

Install crank shaft onto the left crankcase and install crank shaft install socket.
Special tool:
Crank shaft install socket & oil seal driver SYM-2341110- HMA RB1

Turn in the crank shaft puller spiral tooth to the left crank shaft.
Special tool:
L. Crank shaft puller SYM-1130000-HMA H9A



Hold left crank shaft puller, and turn the shaft puller nut by clutch nut wrench to pull in crank shaft into left crankcase.

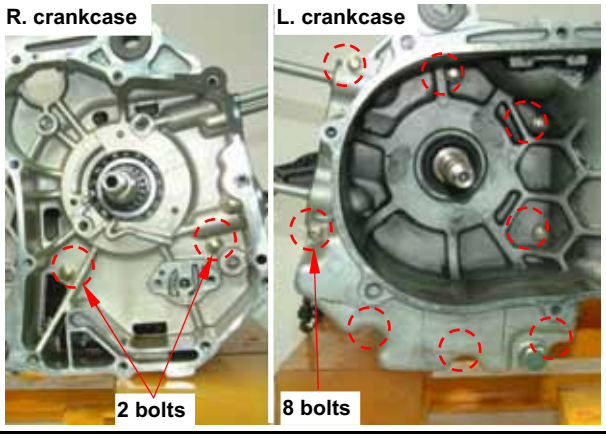
Put wave washer onto right crank bearing.

Caution

- Right flank the wave washer piece certainly must install. Cannot install the wrong position or leak the attire. Otherwise can cause the motorcycle to have the fierce vibration

Install 2 dowel pins and new gasket.
Install the right crankcase onto the left crankcase

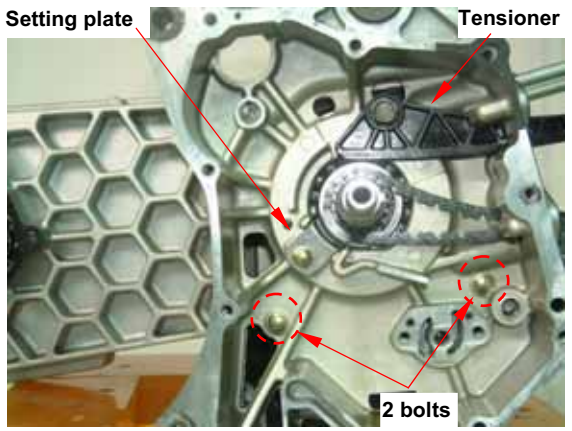
Tighten 8 bolts on the left crankcase.
Tighten 2 bolts on the left crankcase.
Torque value: 0.8~1.2kgf-m



Apply a layer of grease on the lip of oil seal
Clean the crankshaft with clean solvent.

Install the oil seal in the left crankcase with special tool.
Special tool:
Crank shaft install socket & oil seal driver
SYM-2341110- HMA RB1

Install the cam chain tensioner & and tighten the bolts.
Torque value: 1.2~1.6kgf-m
Install the cam chain.
Install the cam chain setting plate.



Mechanism Diagram ·····12-1	Coolant Replacement ····· 12-5
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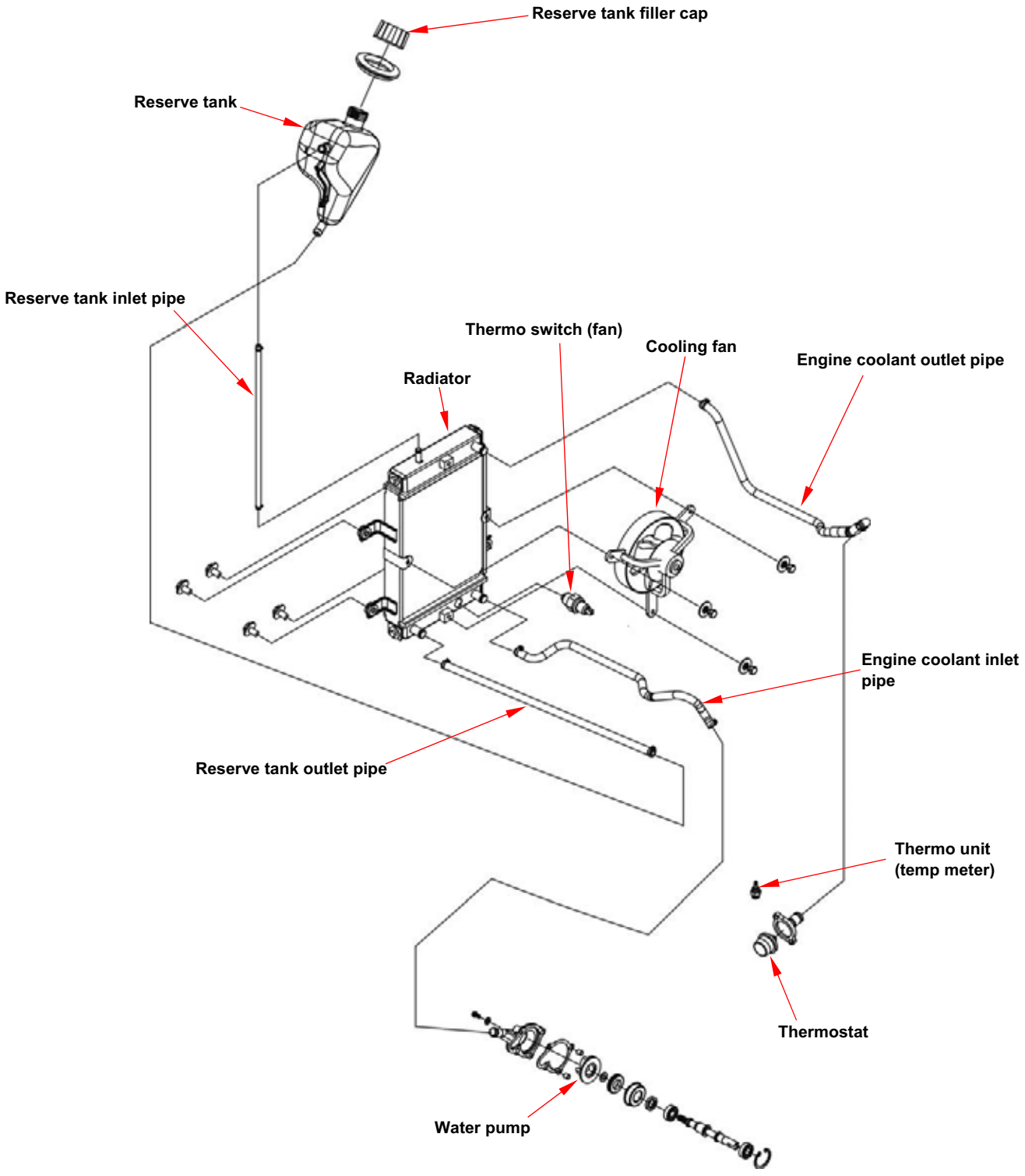
Cooling System Fault Elimination ····12-3	Thermostat ····· 12-12

Mechanism Diagram



General Information

General

⚠ Warning

- While the engine is running, never attempt to open the radiator filler cap, the pressurized hot coolant may shoot out and cause serious scalding injury. No maintenance work is allowed to perform unless the engine is completely cooled down.

- Refill the radiator with distilled water or specified additives.
- Add coolant to the reserve tank.
- The cooling system can be serviced on the motorcycle.
- Never spill the coolant to the painted surface.
- Test the cooling system for any leakage after repair.
- Please refer to Section 17 for inspection of the temperature sensor switch for the fan motor and the water thermometer.

Technical Specification

Item	Specification
Pressure to open filler cap	0.9±0.15 Kg/cm²
Capacity of coolant: Engine + radiator Reserve tank	1400c.c. 420c.c.
Thermostat	Begins to activate at : 82~92ºC Stroke : 0.05~3.0mm/80ºC
Boiling point	Not-pressure : 107.7ºC Pressurized: 125.6ºC

Torque Value

For water pump rotor 1.0~1.4kgf-m

Tools Requirement

Special tools

Water pump bearing driver (6901): SYM-9100100
Water pump oil seal driver (Inner): SYM-9120500-H9A
Water pump mechanical seal driver: SYM-1721700-H9A
Inner bearing puller: SYM-6204020

Trouble Diagnosis

The engine temperature is too high

- The water thermometer and the temperature sensor do not work properly.
- The thermostat is stuck to closed.
- Insufficient coolant.
- The water hose and jacket are clogged.
- Fan motor malfunction.
- The filler cap of the radiator malfunction.

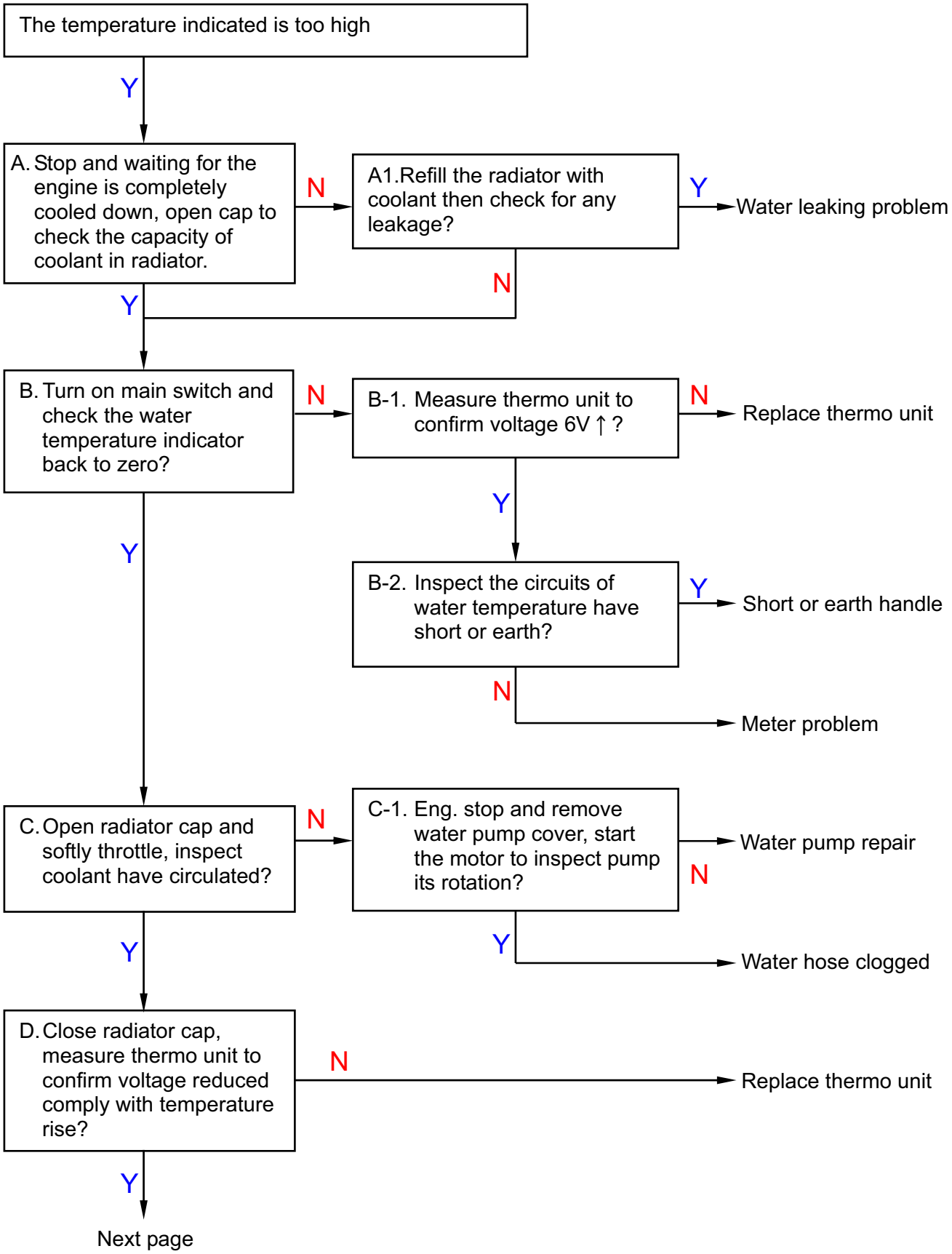
The engine temperature is too low

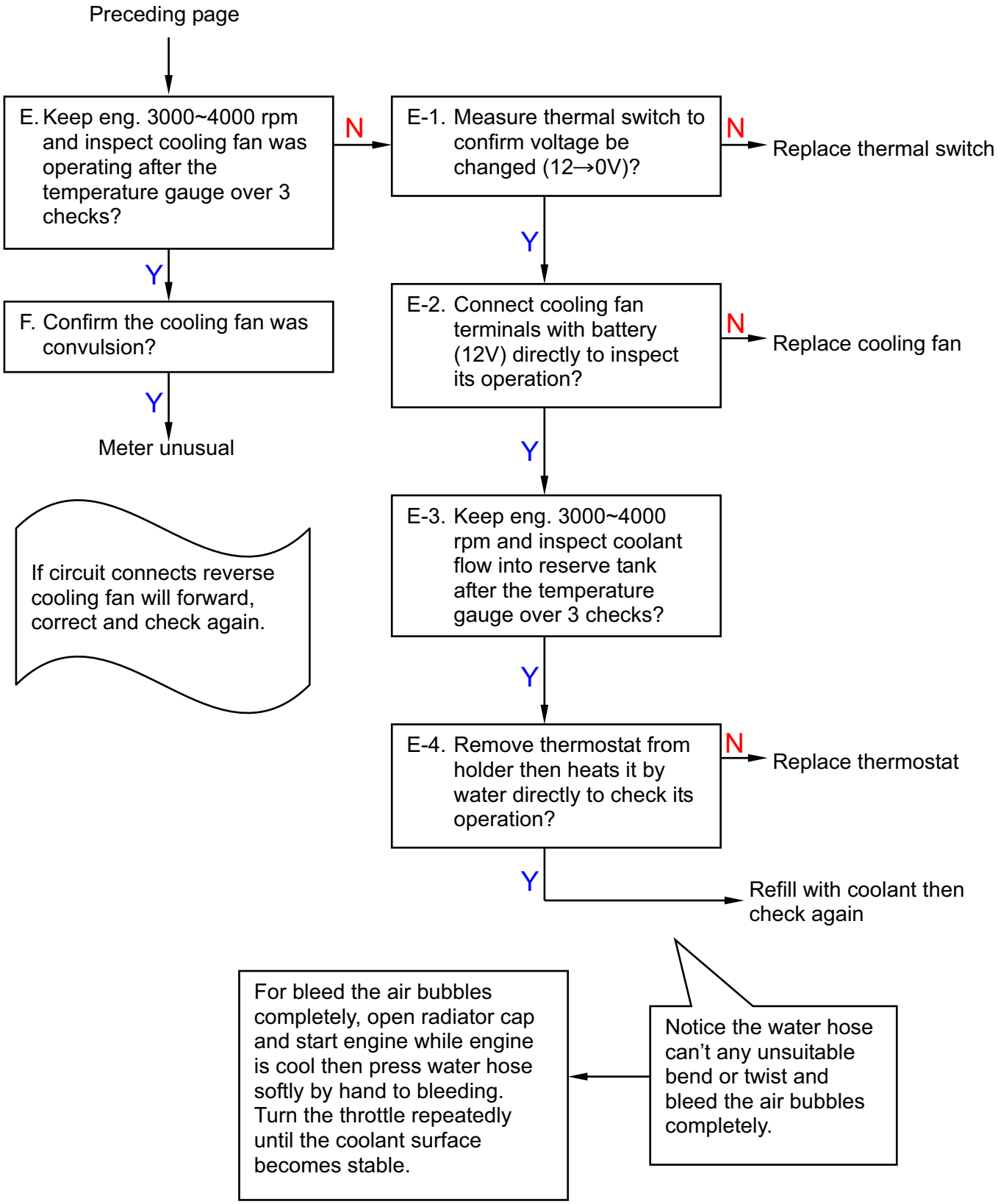
- The water thermometer and the temperature sensor malfunction.
- The thermostat is stuck to open.

Coolant is leaking

- The water pump mechanical seal does not function properly.
- The O ring is deteriorated.
- The water hose is broken or aged

Cooling System Fault Elimination


The temperature indicated is too high
Y
A. Stop and waiting for the engine is completely cooled down, open cap to check the capacity of coolant in radiator.
N
A1.Refill the radiator with coolant then check for any leakage?
Y
Water leaking problem
N
Y
B. Turn on main switch and check the water temperature indicator back to zero?
N
B-1. Measure thermo unit to confirm voltage 6V ↑ ?
N
Replace thermo unit
Y
Y
B-2. Inspect the circuits of water temperature have short or earth?
Y
Short or earth handle
N
Meter problem
C. Open radiator cap and softly throttle, inspect coolant have circulated?
N
C-1. Eng. stop and remove water pump cover, start the motor to inspect pump its rotation?
Water pump repair
N
Y
Water hose clogged
Y
D. Close radiator cap, measure thermo unit to confirm voltage reduced comply with temperature rise?
N
Replace thermo unit
Y
Next page


Preceding page
E. Keep eng. 3000~4000 rpm and inspect cooling fan was operating after the temperature gauge over 3 checks?
N
E-1. Measure thermal switch to confirm voltage be changed (12→0V)?
N
Replace thermal switch
Y
Y
F. Confirm the cooling fan was convulsion?
E-2. Connect cooling fan terminals with battery (12V) directly to inspect its operation?
N
Replace cooling fan
Y
Y
Meter unusual
If circuit connects reverse cooling fan will forward, correct and check again.
E-3. Keep eng. 3000~4000 rpm and inspect coolant flow into reserve tank after the temperature gauge over 3 checks?
Y
E-4. Remove thermostat from holder then heats it by water directly to check its operation?
N
Replace thermostat
Y
Refill with coolant then check again
For bleed the air bubbles completely, open radiator cap and start engine while engine is cool then press water hose softly by hand to bleeding. Turn the throttle repeatedly until the coolant surface becomes stable.
Notice the water hose can't any unsuitable bend or twist and bleed the air bubbles completely.

Coolant Replacement

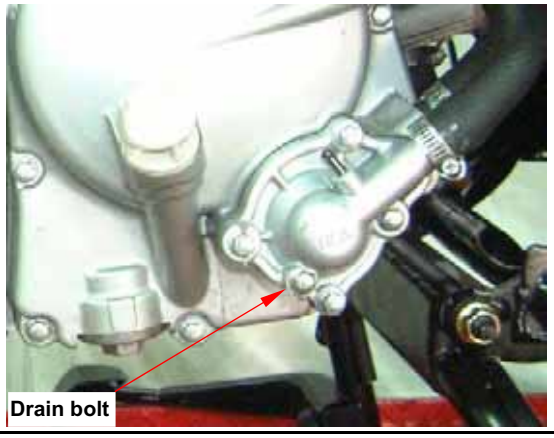
Warning

- Never attempt to carry out service work on the cooling system unless the engine is completely cooled down, otherwise, you may get scalded.

Remove the reserve tank cap cover, and then remove tank cap.

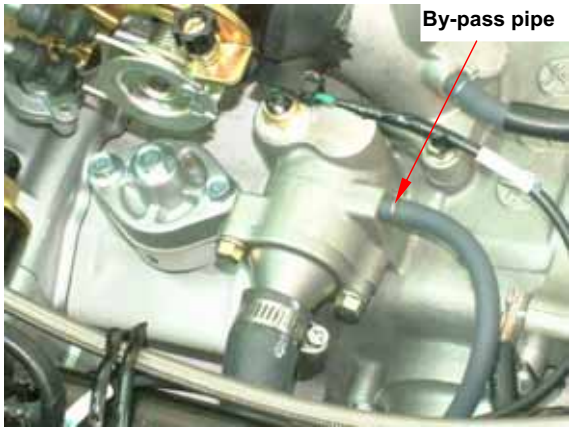
Place a water pan under the water pump; loosen the drain bolt to drain out the coolant.

Reinstall the drain bolt.



Refill system with the coolant and bleed out the air bubbles.

- Run the engine, and remove by-pass pipe.
- Check the by-pass hole and see if the air bubble emit or not.
- If there is no air bubble emit with only the coolant flow out, then reinstall the pipe and shut down the engine.
- Remove the radiator filler cap.
- Start the engine; make sure the coolant level is stable without any air bubble emitting.
- Shut down the engine; add the coolant to the proper level if necessary.
- Reinstall the radiator filler cap.



Caution

- To avoid the water tank rusting, do not use the uncertified coolant.

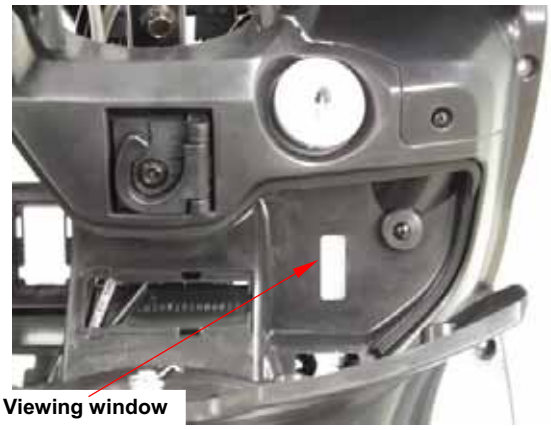
Coolant recommended: SYM Bramax radiator agent.
Concentration: 50%

Check reserve tank

- Open the inner box lid.
- Check the coolant level in the reserve tank.
- Add coolant to proper level if too low.

⚠ Caution

- Do not make the coolant level in the reserve tank too high, whick



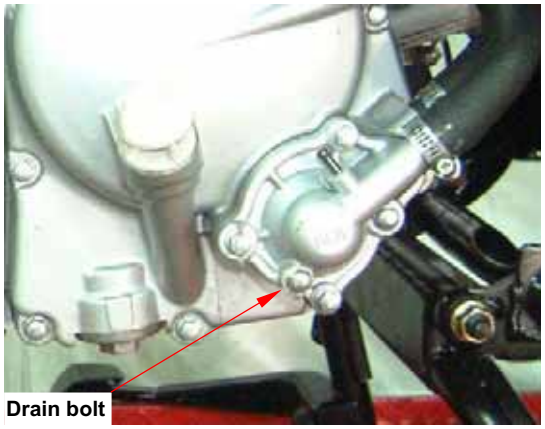
Radiator

Check

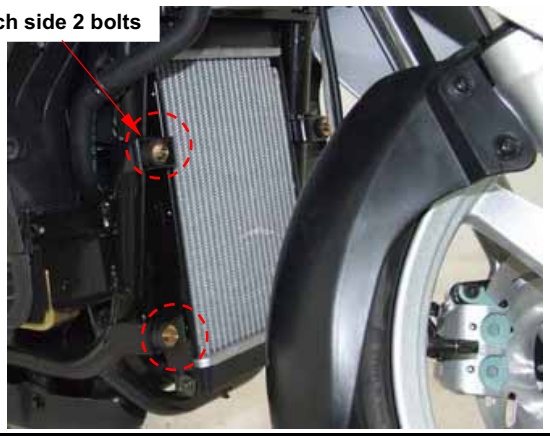
Check for any leakage from weld seam.
Blow radiator clean using compressed air. If the radiator is blocked by dirt, use low pressure water jet to clean it.
Care shall be taken when straightening the sink fan.

Remove

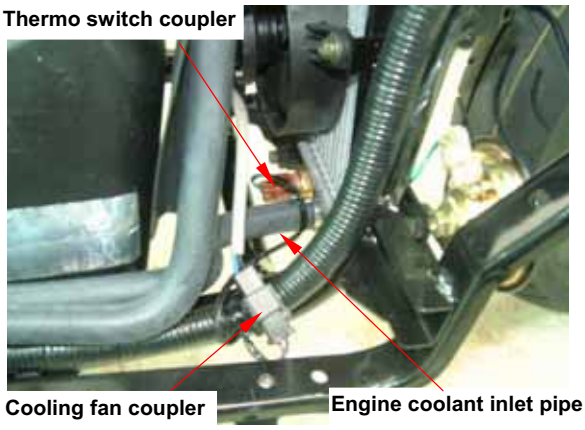
Place a water pan under the water pump; loosen the drain bolt to drain out the coolant.



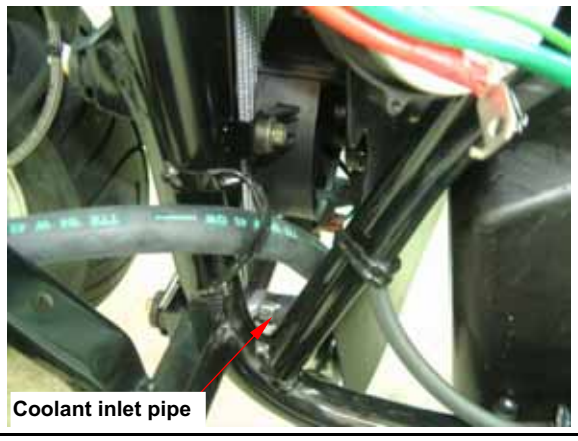
Remove the front cover and under spoiler (refer chapter 12).
Loosen the radiator mounting bolts (4 bolts).



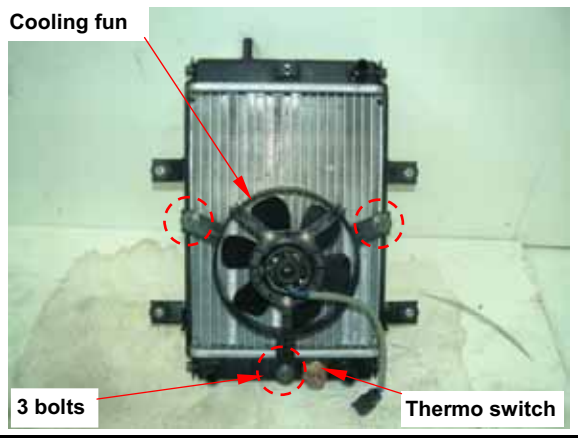
Disconnect the couplers for the thermo switch and fan motor.
Remove engine coolant inlet pipe, reserve tank inlet pipe and radiator inlet pipe.



Remove reserve tank coolant inlet pipe.
Remove the radiator and the cooling fun.



Loosen the cooling fun mounting bolts (3 bolts).
Remove thermo switch.



Installation

Install the removed parts in the reverse order of removal.
Install radiator in the reverse order of removal.
Upon completion, check for any leakage.

⚠ Caution

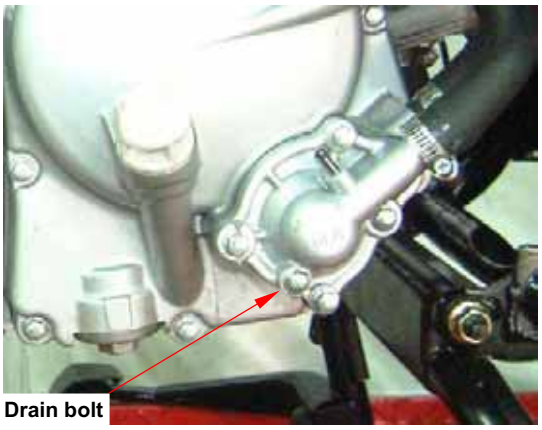
- Liquid packing must be applied to the thermo switch before installing to avoid damaging the radiator.

Water Pump

Check water pump seal / cooling system divulges inspection

- Disassembles the refrigerant drain bolt, overflows little buckles the N actually fluid, confirmed overflows the refrigerant whether has the greasy dirt.
- Turns on lathe the engine oil gauge rule, the inspection engine oil whether does have bleaches situation of the emulsified.

If has the above two kind of interior to divulge the phenomenon, possibly for the water pump inner two seal damages, the engine cooling system damages or the cylinder and the cylinder head gasket damages, please first dismantles the right crank case to say A confirms the replacement water pump seal, if does not have the question to take apart for overhaul cooling system of system again the cylinder head, the cylinder.



Removal of water pump

Loosen the drain bolt to drain out the coolant.
Remove the water hose.
Loosen 4 bolts and remove the pump cover.
Loosen 10 bolts and remove the engine right cover.
Take off the gasket and dowel pins.

Turn pump rotor clockwise and remove.

⚠ Caution

- The rotor is provided with left turn thread.

Remove the cir clip from the right crankcase cover.
Remove the water pump shaft and the inner bearing.
Remove the outside bearing by inner bearing puller.
Rotate the inner ring of bearing, the bearing shall move smoothly and quietly.
If the bearing does not rotate smoothly or produces a noise, replace it with new one.

Check any wear and damage of the mechanical seal and inside seal.

⚠ Caution

- The mechanical seal and inside seal must be replaced as a unit.

Replacement of Mechanical Seal

Remove the inside bearing by inner bearing puller. Drive the mechanical seal and inner seal out of the right crankcase.

Special tools:
Inner bearing puller
Water pump bearing drive
SYM-9100100

⚠ Caution

- Replace a new mechanical seal after removing it.

Apply a coat of sealant to the mating surfaces of the right crankcase before installing the new mechanical seal.

Install the mechanical seal onto the right crankcase.

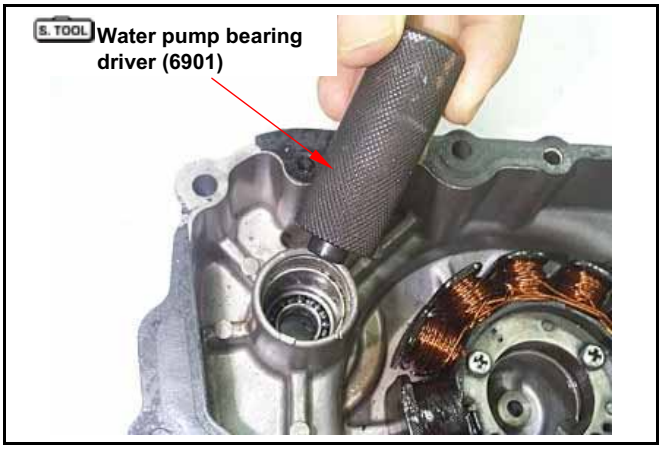
Special tools:
Water pump mechanical seal driver
SYM-1721700-H9A

Install the new inner seal onto the right crankcase.
Special tools:
Water pump oil seal driver (inner)
SYM-9120500-H9A

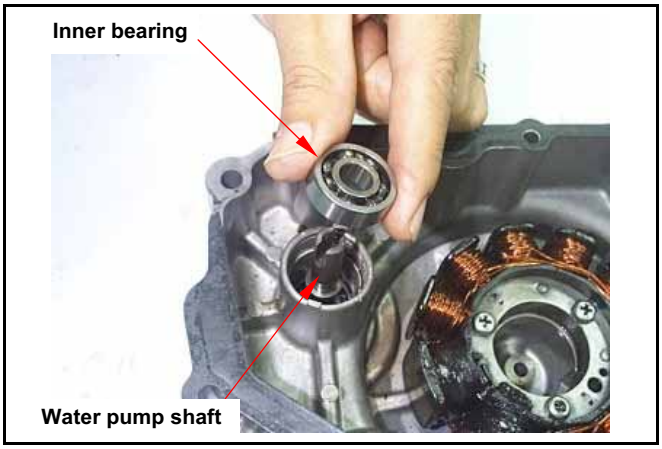
Install a new outside bearing to the right crankcase cover.
Special tools:
Water pump bearing driver (6901)
SYM-9100100

⚠ Caution

- Do not reuse old bearing. It must be replaced with a new one once it has been removed.



Mount the water pump shaft and the inner bearing to the right crankcase cover.



Install the cir clip to hold the inner bearing.

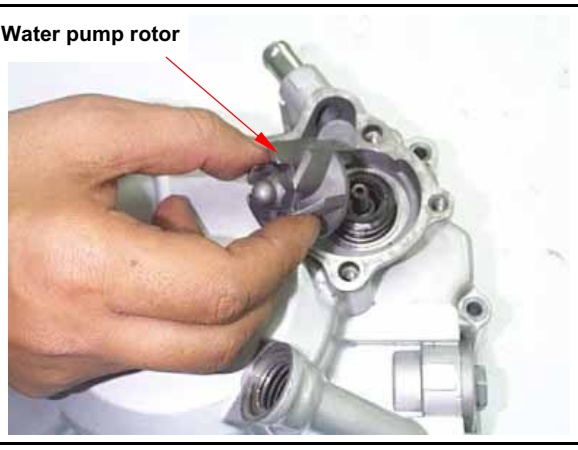
Install the seal washer into the rotor.

Caution

- Washer must be replaced together with the mechanical seal.

Install the rotor onto the water pump shaft and tighten.

Torque Value: 1.0~1.4kgf-m



Caution

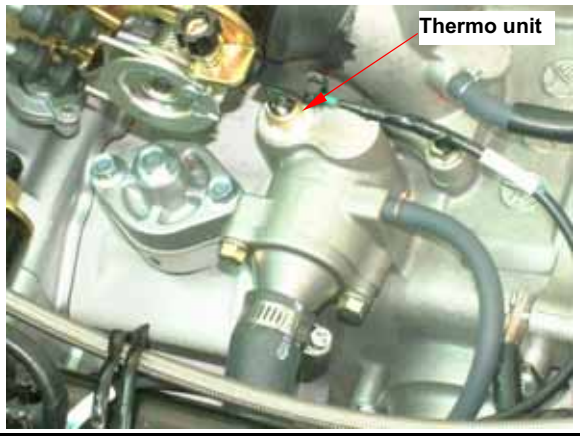
- The rotor is left thread.

Install the dowel pin and right cover gasket.
The rotation water pump rotor, causes the water pump drive shaft scoop channel, aligns the oil pump drive shaft flange, install the right crank case. (10 bolts)

Install the dowel pin and new gasket.
Install the water pump cover with 4 bolts.

Thermostat

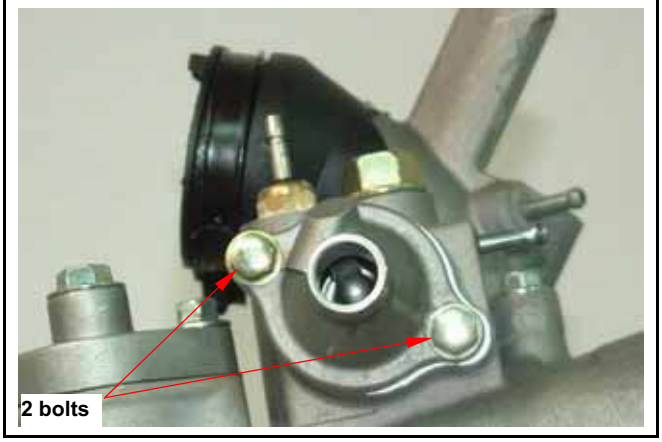
Please refer to chapter 17 for inspection of thermo unit.



Removal

Remove the luggage box and body cover.
Drain out the coolant.

Remove the thermostat cover. (2 bolts)

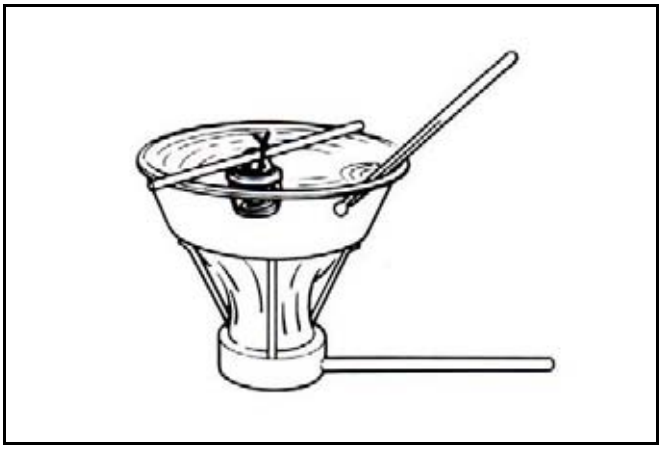


Remove the thermostat.

Inspection

Visually inspect thermostat for any damage.

Place the thermostat into heated water to check its operation.



⚠ Caution

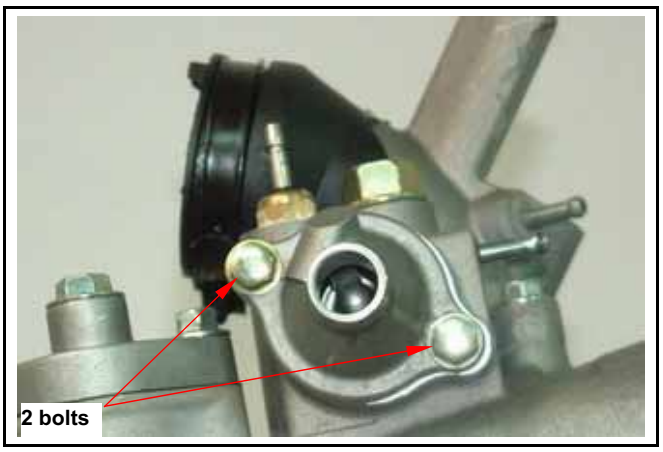
- Whenever the thermostat and the thermometer are in contact to the wall of heated water container, the reading displayed is incorrect. If the valve of the thermostat remains open at room temperature or the valve operation is not corresponding to the temperature change, then it must be replaced.

Technical Data

Valve begins to open	82~95℃
Valve stroke	0.05 ~ 3mm

Installation

Install the thermostat.
Install the thermostat cover. (2 bolts)
Refill the coolant and bleed out the air bubble (Page 12-5).



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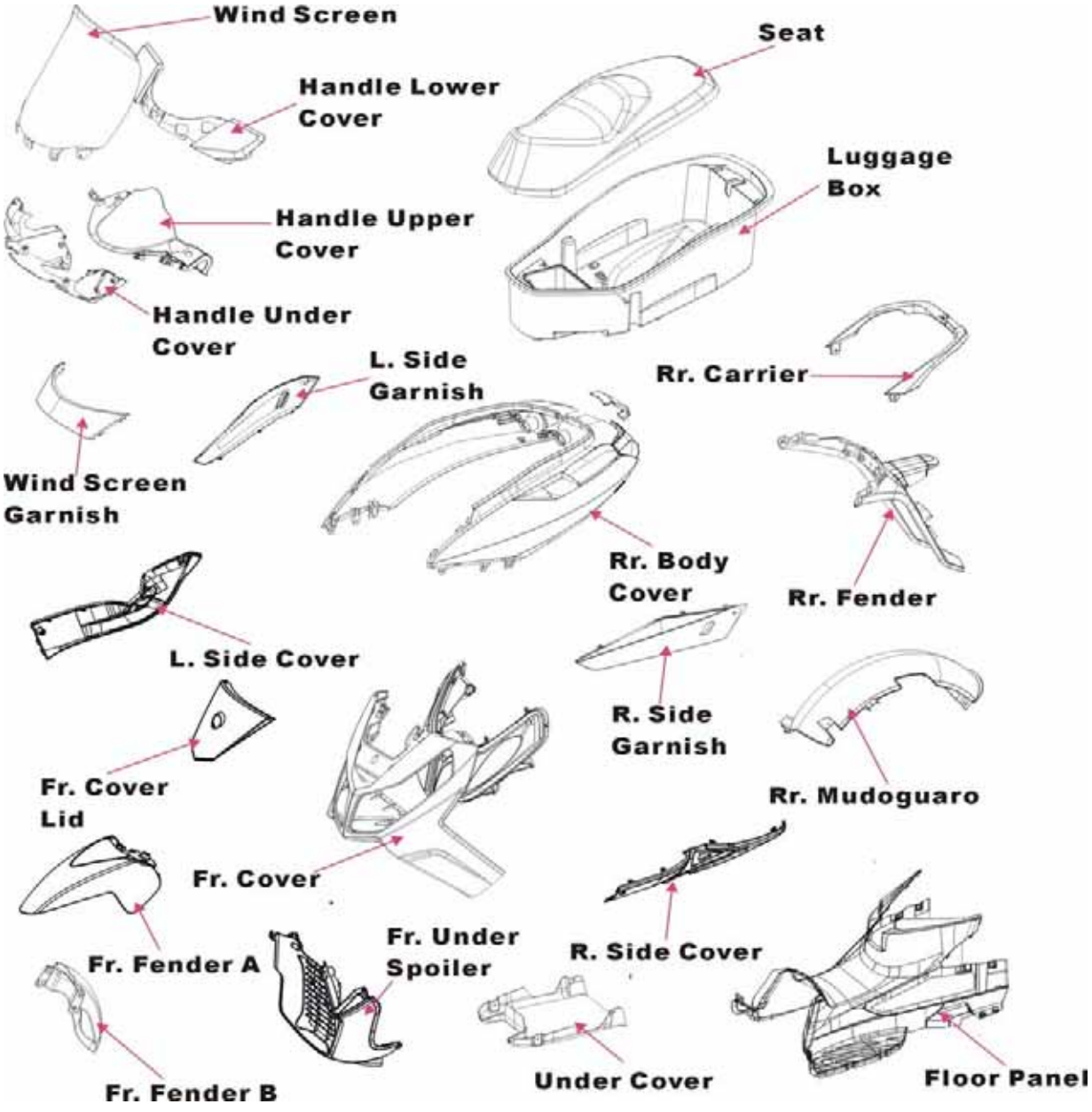
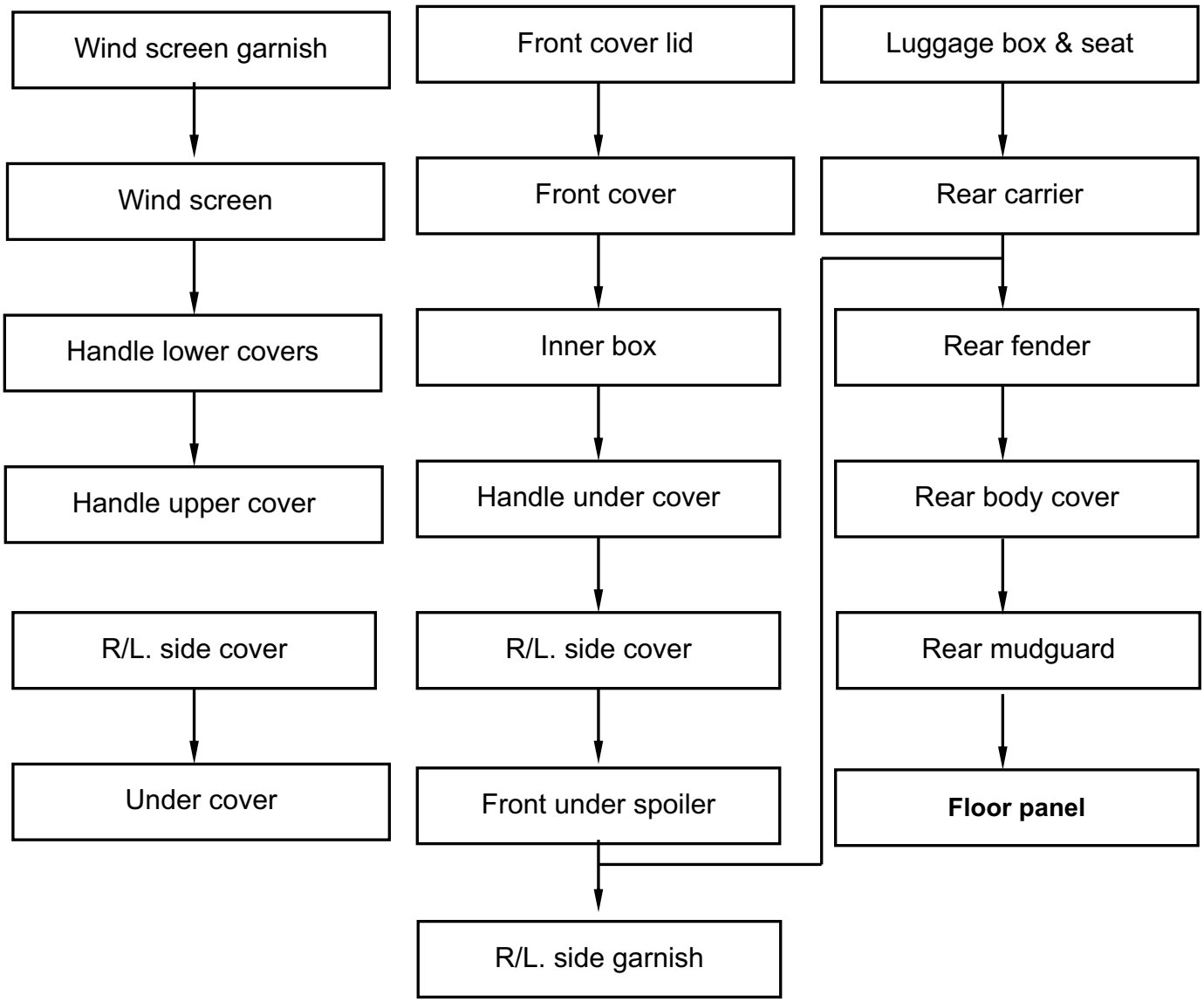
Mechanism Diagram



13

Maintenance

Body covers disassemble sequence:



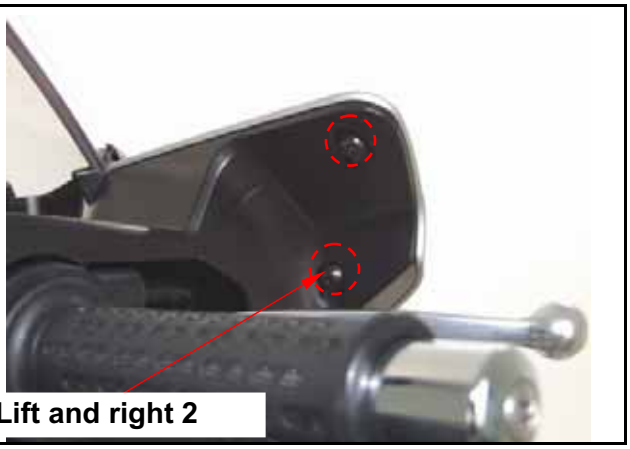
- Be careful not to damage various covers in assembly or disassembly operation.
- Never injure hooks molded on the body covers.
- Align the buckles on the guards with slot on the covers.
- Make sure that each hook is properly installed during the assembly.
- Never compact forcefully or hammer the guard and the covers during assembly.

Handle Front Cover

Remove

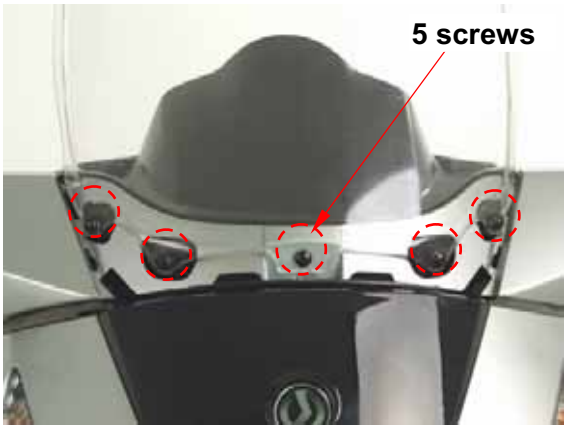
Loosen 2 screw bottom of front handle cover

Loosen 2 screws from left and right side for handle front cover after side



Wind Screen

Remove the 5 screws from to meter visor.



Remove handle meter visor.

Installation

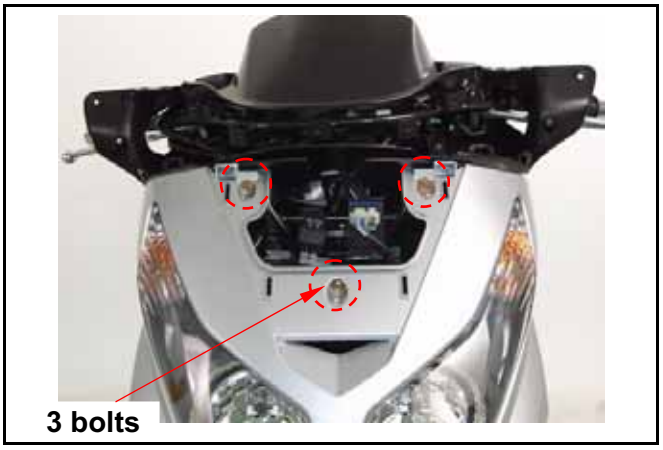
Install in reverse order of removal procedures.

Front Cover

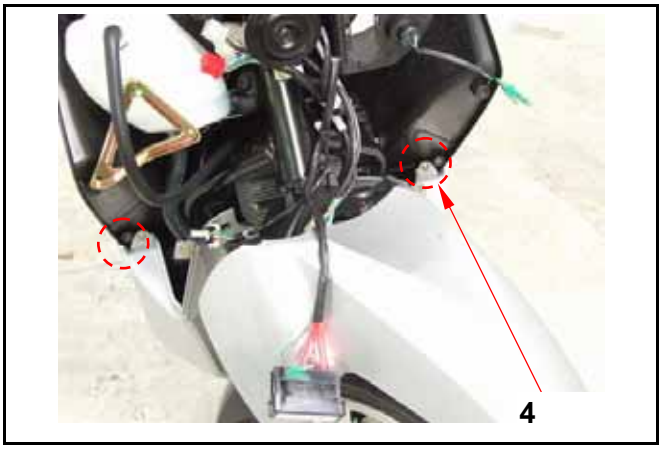
Remove

Loosen 2 screws from the front cover emblem.

Loosen 3 bolts from the front cover front end.

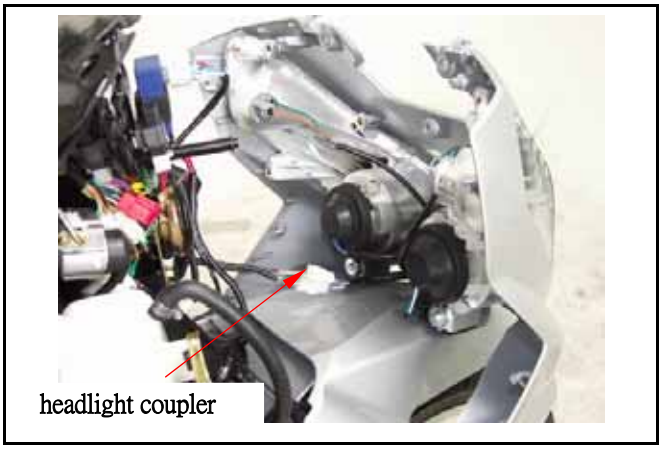


Loosen 8 screws from each side 4 screws for front cover after side



Disassemble the headlight coupler

Remove the front cover.

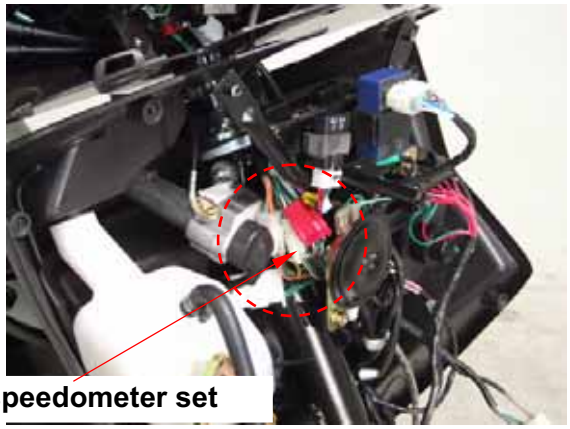


Installation

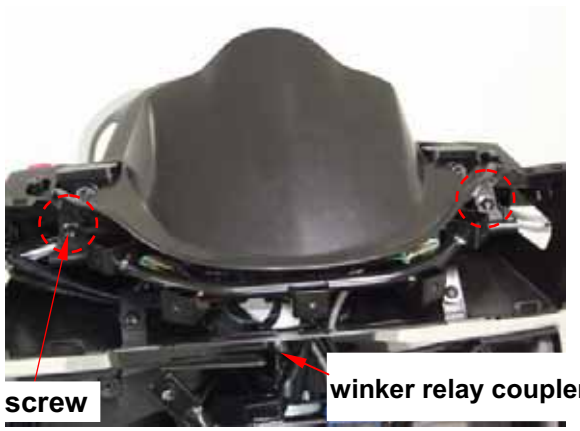
Install in reverse order of removal procedures.

Handle upper cover

Disassemble the speedometer set couplers

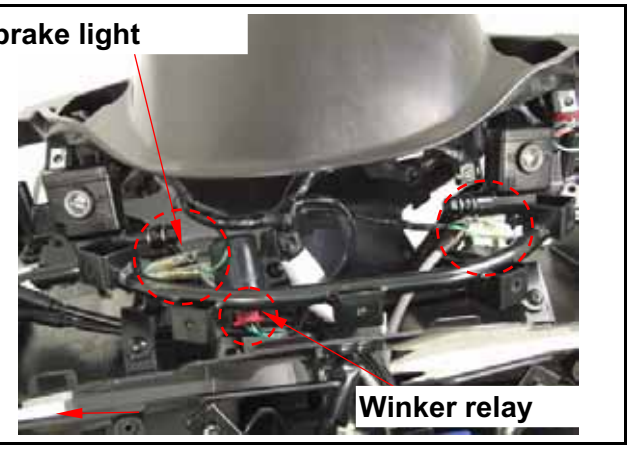


Loosen 2 screws from the handle front cover upper side.



Remove the 4 screw from the handle lower cover rear side.

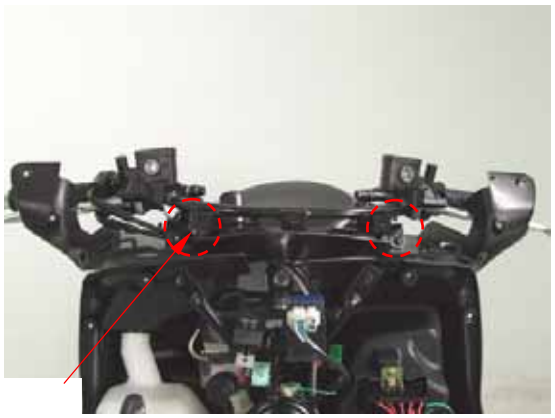
Disassemble the winker relay and brake light couplers
Remove the handle upper cover.



Installation
Install in reverse order of removal procedures.

Handle lower cover

Loosen the 2 screws from handle lower cover.



Remove the handle stand nut and bolt.
Improve the direction handle up.

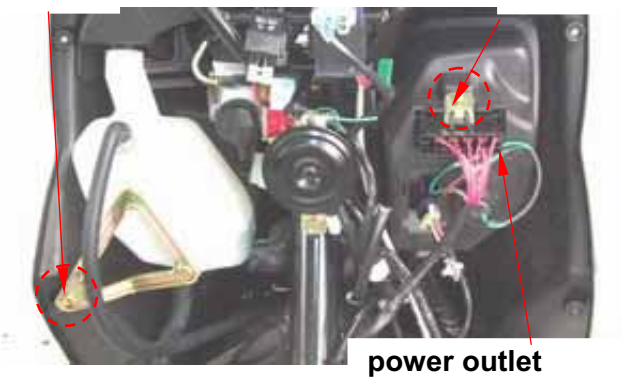
Remove the handle lower cover.

Installation
Install in reverse order of removal procedures.

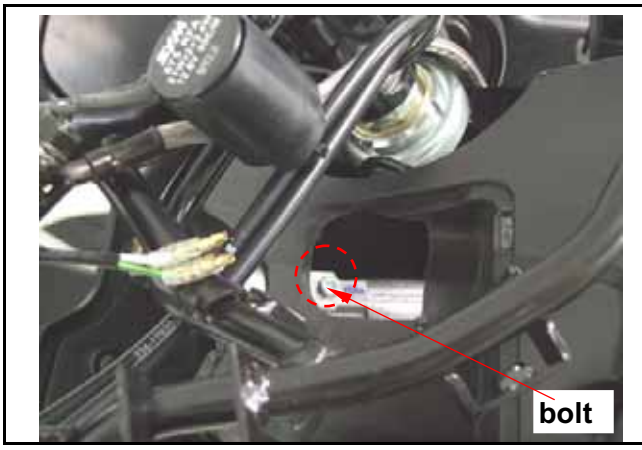
Inner Box

Remove

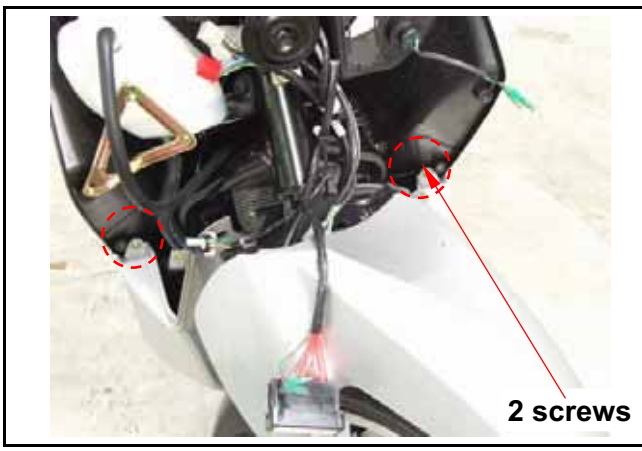
Remove 1 screw on the fuse box stay and . 1 screw on the reserve tank stay.
Remove the dc power outlet connect.



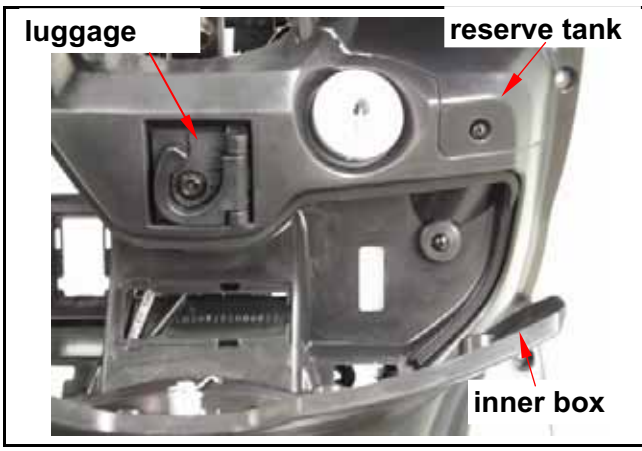
Remove main switch cap bolt then remove main switch cap.



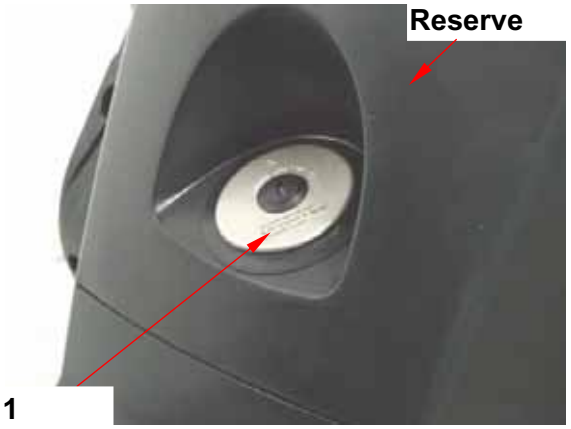
Loosen 2 screws from the front spoiler.



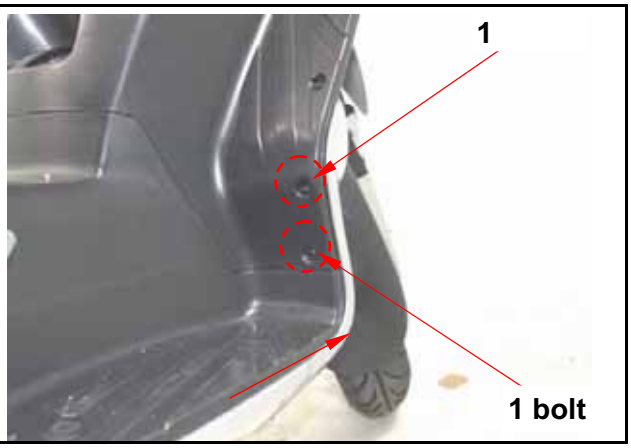
Open inner box lid.
Remove 1 screw from the inner box in side.
Remove 1 screw from reserve tank lid.
Remove 1 bolt from luggage hook then remove luggage hook.



Remove fuel tank cap and rubber.



Loosen 1 screw and 1 bolt from left and right side for inner box down side



Remove reserve tank cap then separate the reserve

Remove the inner box.

Installation
Install in reverse order of removal procedures.

Side Cover

Remove:
Loosen 1 screw from left and right side for side covers font side.

Loosen 1 screw from left and right side for side covers rear upper side.

Remove side cover.

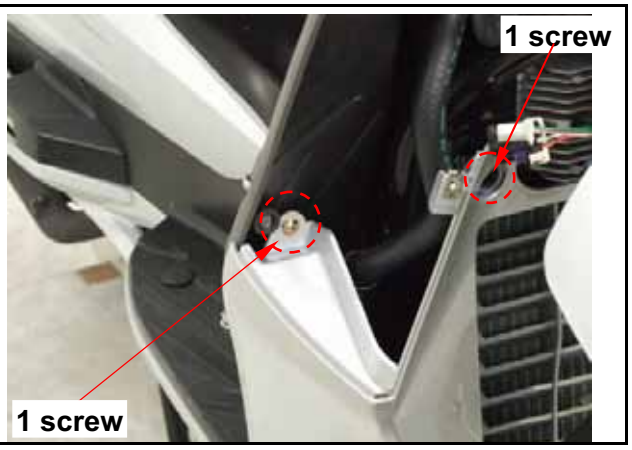
Installation
Install in reverse order of removal procedures.

Front Under Spoiler

Remove

Remove the side cover.

Loosen 1 screws and 1 bolt from the front spoiler front side.



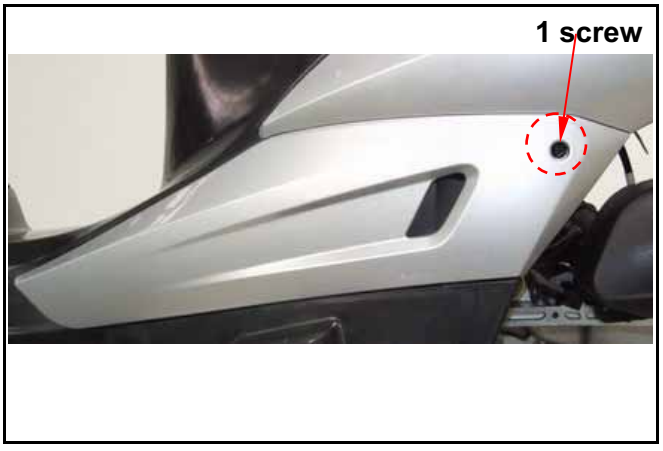
Remove the front spoiler.

Installation

Install in reverse order of removal procedures.

Side Garnish

Loosen 1 screw from left and right side for side garnish.



Remove the left and right side garnish.

Installation

Install in reverse order of removal procedures.

Front Fender

Remove front fender B

Loosen each side 2 bolts from front fender B.

.

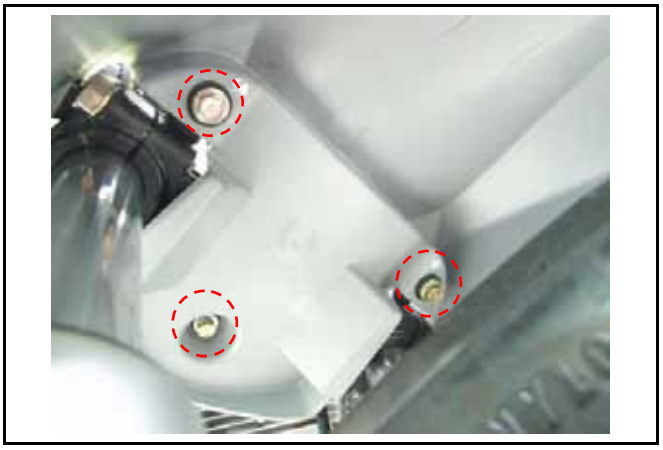
Remove the front fender B.

Installation

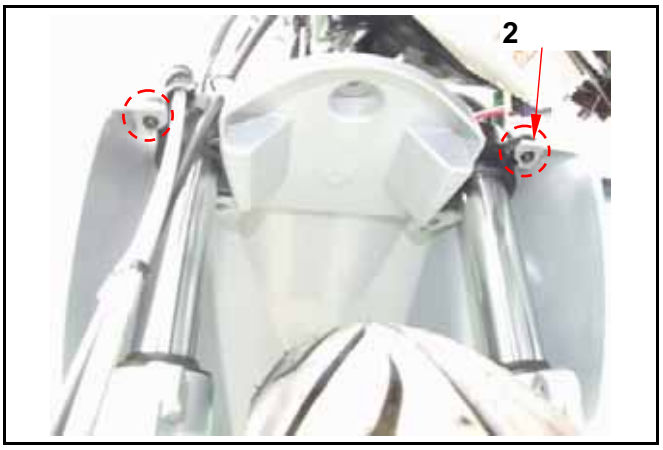
Install in reverse order of removal procedures.

Remove front fender A

Loosen 3 bolts from the front fender above the inside



Loosen 2 screws from the front fender above the inside



Remove the front fender A.

Installation

Install in reverse order of removal procedures.

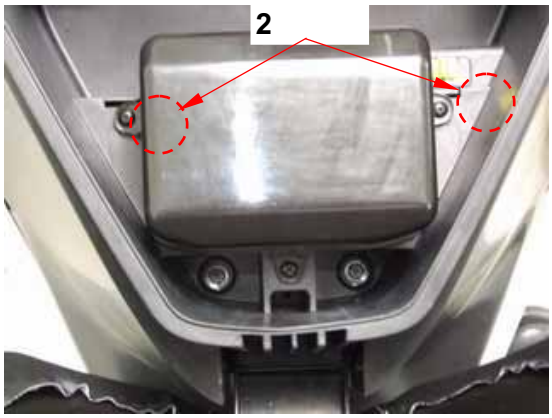
Luggage Box

Remove

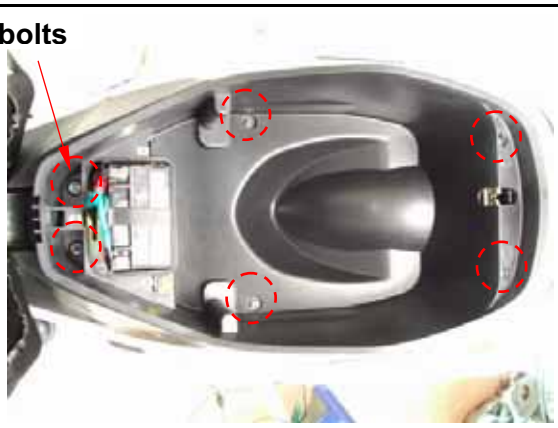
Open the seat.

Loosen 3 screws from the battery cover.

Remove the battery cover.



Loosen 6 bolts from luggage box.



Disconnect the luggage box light and switch coupler.

Remove the luggage box.

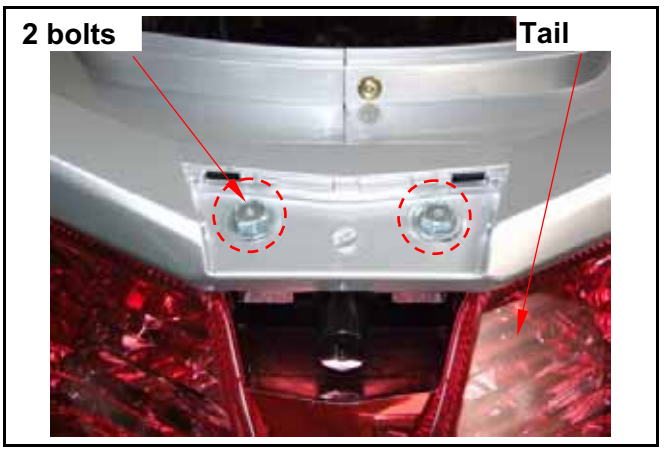
Installation

Install in reverse order of removal procedures.

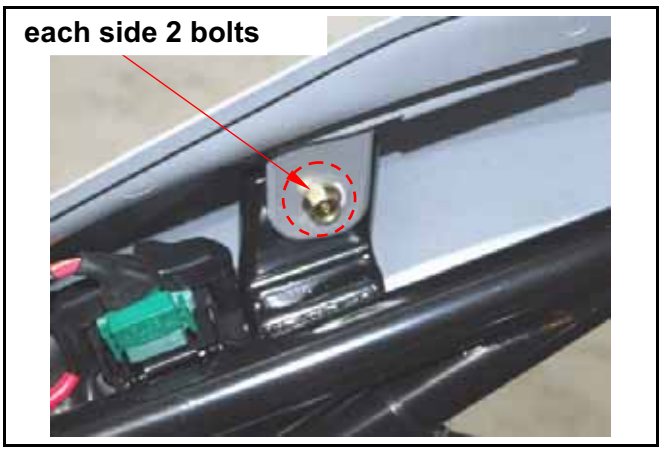
Rear Carrier

Loosen 1 screw front the rear center cover.

Loosen 2 bolts front tail light upper side.



Loosen each side 2 bolts from body inside.



Remove the rear carrier.

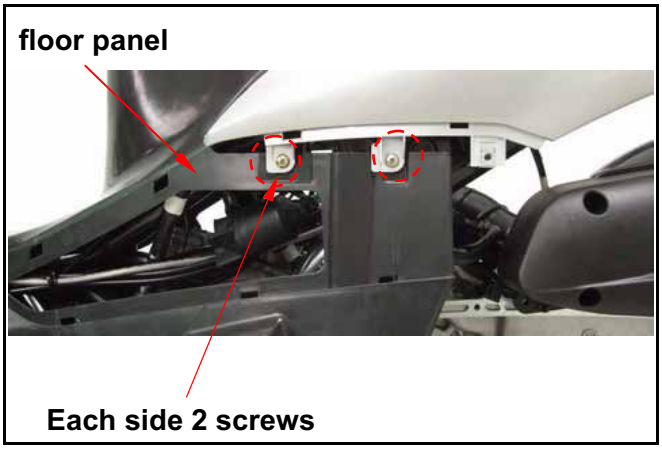
Installation
Install in reverse order of removal procedures.

To this chapter co

Rear Body Cover

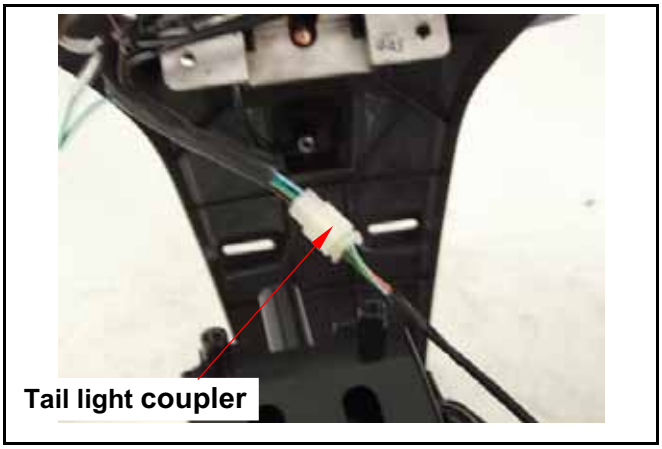
Remove

Loosen Each side 2 screws from rear end of floor panel.



Loosen 2 bolts from rear fender.

Disconnect the tail light coupler.



Remove the body cover.

Installation

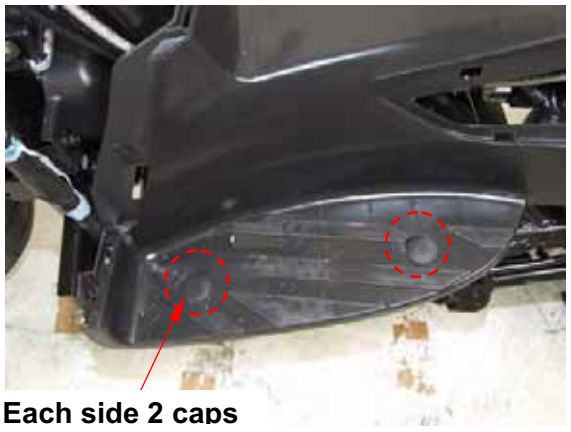
Install in reverse order of removal procedures.

Floor Panel

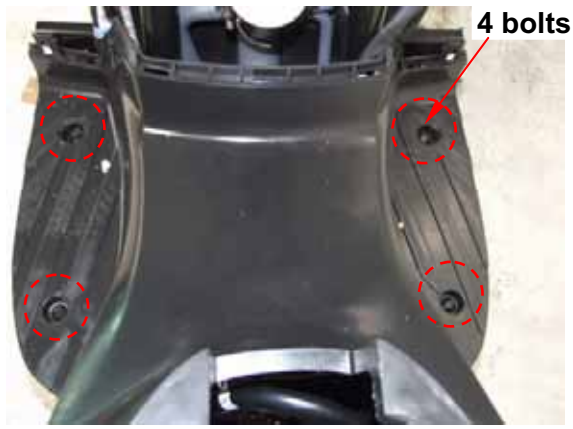
Remove

Remove side garnish, front cover, front spoiler, R/L side cover, inner box, luggage box and body cover.

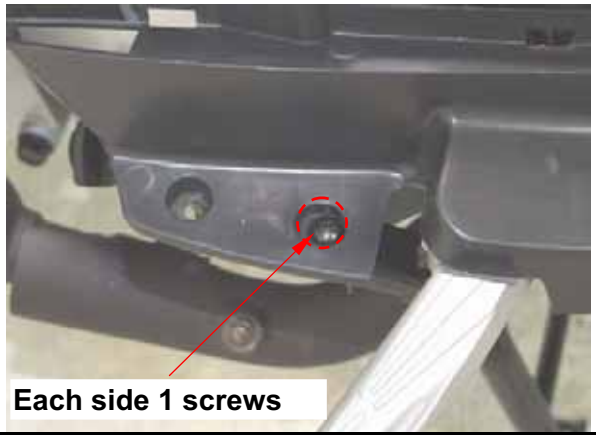
Remove each side 2 caps from floor panel.



Loosen 4 bolts from floor panel



Loosen each side 1 screws from floor panel rear side.



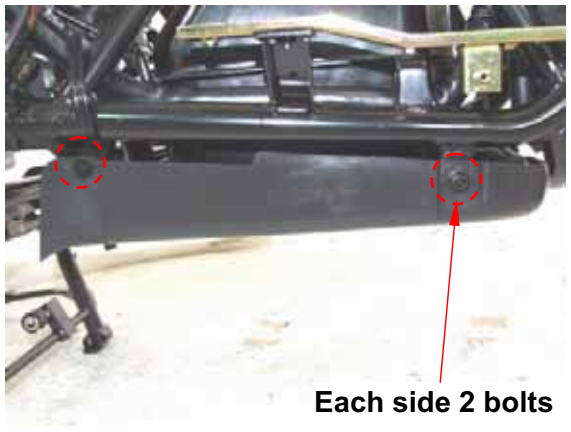
Remove floor panel.

Installation

Install in reverse order of removal procedures.

Under Cover

Each side 2 bolts from under cover.



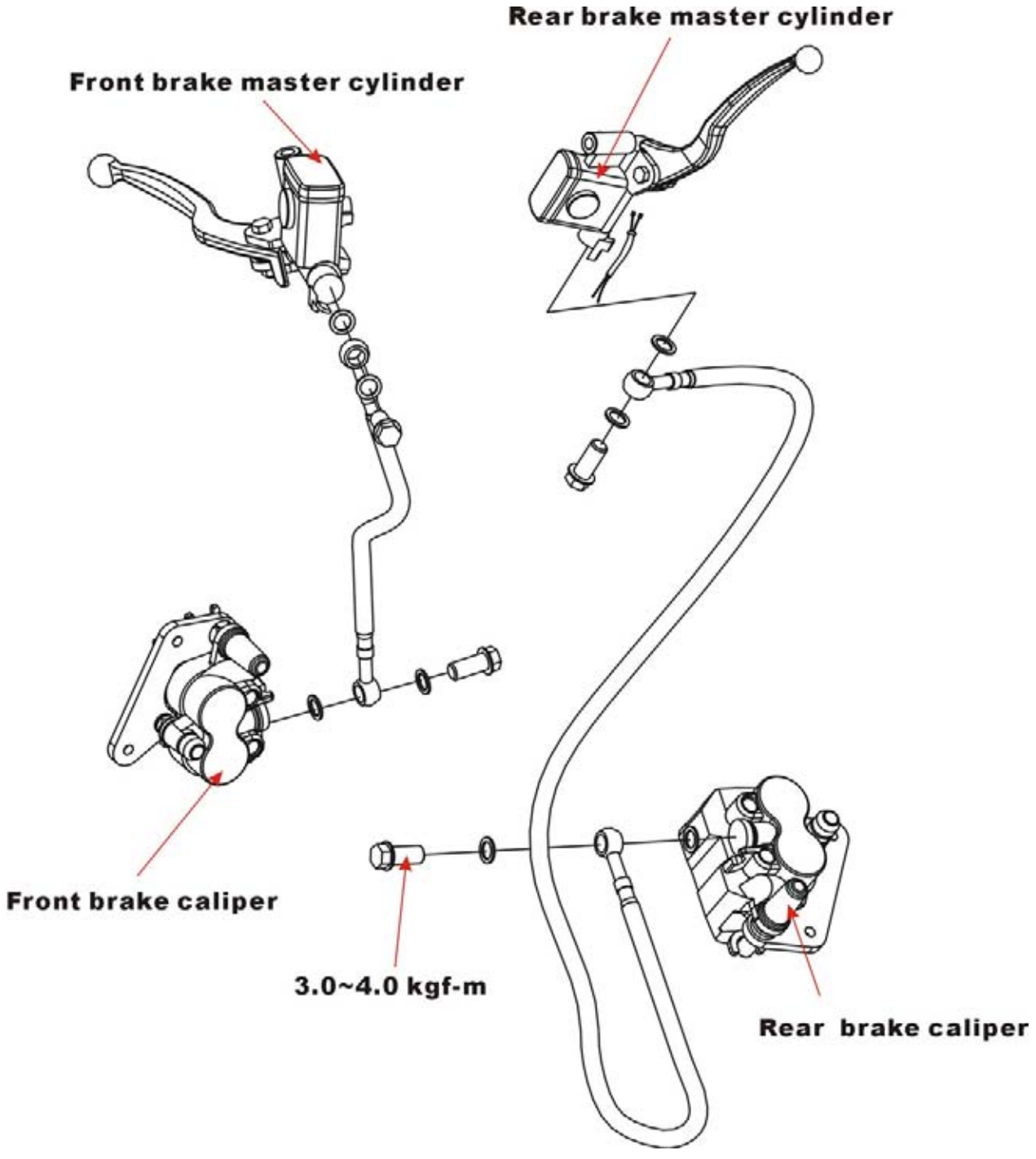
Remove the under cover.

Installation

Install in reverse order of removal procedures.

Mechanism Diagram ····· 14-1	Brake Fluid Replacement ····· 14-6
Maintenance Description ····· 14-2	Front Brake Caliper ····· 14-7
Trouble Diagnosis ····· 14-3	Rear Brake Caliper ····· 14-8
Disk Brake System Inspection ····· 14-4	Brake Disk ····· 14-9
Adding Brake Fluid ····· 14-5	Master Cylinder ····· 14-9

Mechanism Diagram



Maintenance Description

Operational precautions

⚠ Caution

- Inhaling asbestos may cause disorders of respiration system or cancer, therefore, never use air hose or dry brush to clean brake parts. Use vacuum cleaner or other authorized tool instead.

- The brake caliper can be removed without removing the hydraulic system.
- After the hydraulic system is removed, or the brake system is felt to be too soft, bleed the hydraulic system.
- While refilling brake fluid, care should be taken not to let the foreign material entering into the brake system.
- Do not spill brake fluid on the painted surfaces, plastic or rubber parts to avoid damage.
- Check the operation of the brake system before riding.

Specifications

unit: mm

Item	Standard	Limit
The thickness of front brake disk	4.000	2.500
The thickness of rear brake disk	5.000	3.500
Front and rear brake disk eccentricity	< 0.100	0.300
Front brake master cylinder inner diameter	11.000~11.043	11.055
Front brake master cylinder piston outer diameter	10.957~10.984	10.945
Rear brake master cylinder inner diameter	14.000~14.043	14.055
Rear brake master cylinder piston outer diameter	13.957~13.984	13.945
Diameter of front disk	240.000	—
Diameter of rear disk	220.000	—
Thickness of front brake lining	5.000	2.000
Thickness of rear brake lining	6.000	2.000

Torque values:

Brake hose bolts	3.0~4.0kgf-m
Bolt for front brake caliper	2.9~3.5kgf-m
Brake lever nut	0.8~1.0kgf-m
Air-bleed valve	0.8~1.0kgf-m

Trouble Diagnosis

Soft brake lever

1. Air inside the hydraulic system
2. Hydraulic system leaking
3. Worn master piston
4. Worn brake pad
5. Poor brake caliper
6. Worn brake lining/disk
7. Low brake fluid
8. Blocked brake hose
9. Warp/bent brake disk
10. Bent brake lever

Hard operation of brake lever

1. Blocked brake system
2. Poor brake caliper
3. Blocked brake pipe
4. Seized/worn master cylinder piston
5. Bent brake lever

Uneven brake

1. Dirty brake lining/disk
2. Poor wheel alignment
3. Clogged brake hose
4. Deformed or warped brake disk
5. Restricted brake hose and fittings

Tight brake

1. Dirty brake lining/disk
2. Poor wheel alignment
3. Deformed or warped brake disk

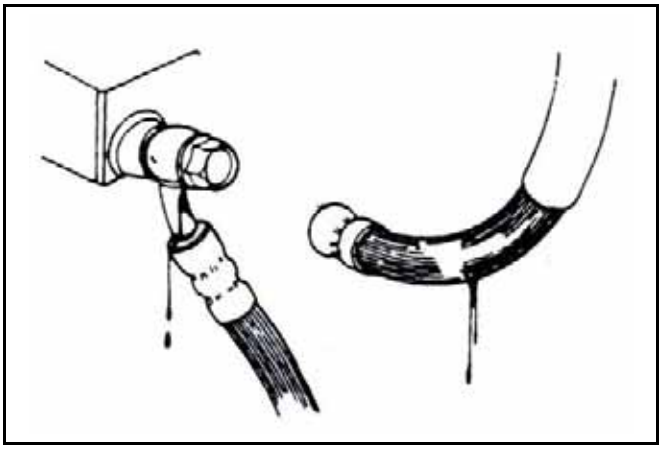
Brake noise

1. Dirty lining
2. Deformed brake disk
3. Poor brake caliper installation
4. Imbalance brake disk or wheel

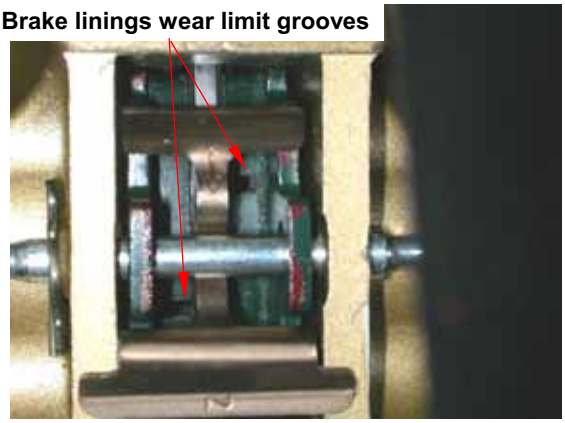
Disk Brake System Inspection

Inspection

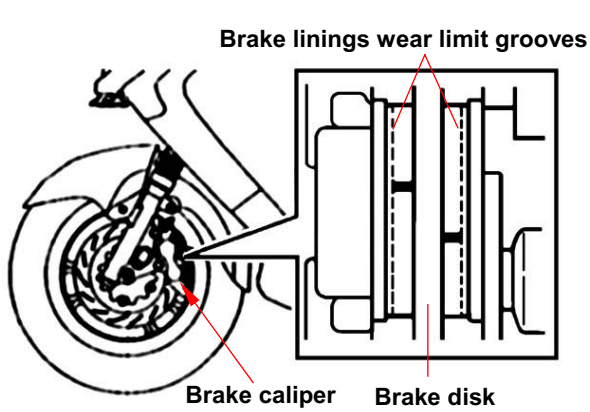
By visual examination whether divulges or the damage, with spanner inspection brake tube seam whether becomes less crowded, and the inspection handle bar turn right or turn left, or pressure the cushion, whether besides the pipeline protection department, whether there is interferes, contacts other parts of.



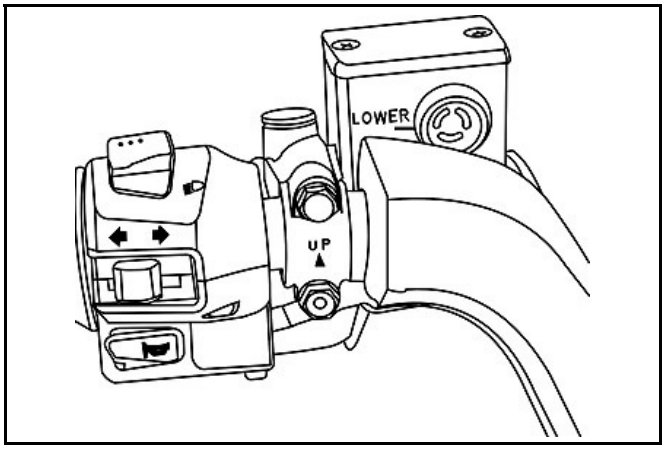
Remove the front brake pad cap.
Check the brake from behind the brake caliper.



The brake pad must be replaced with new lining when the brake pad wear limit reaches the brake disk.



Park the motorcycle on a level ground, and check if fluid level is under the “LOWER” mark.
Recommended Brake Fluid: WELL RUN BRAKE OIL (DOT 3).



⚠ Caution

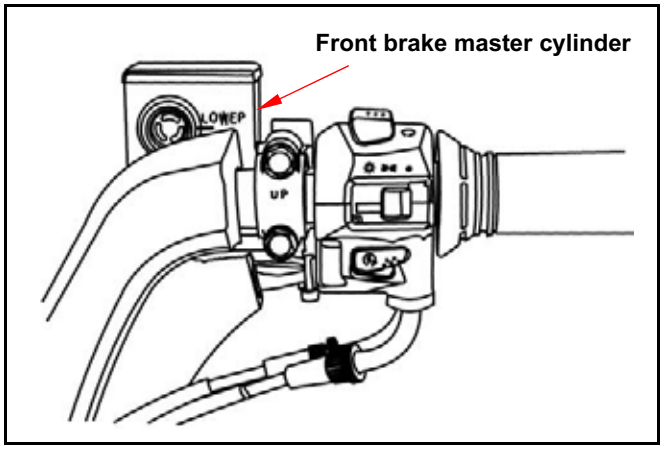
- The vehicles inclined or just stop, the survey oil level could not be accurate, had to settle the 3~5 minute.
- In order to prevent has the chemical change, please do not use counterfeiting or other unclear trade marks brake fluid.
- Uses by all means must with the trade mark brake fluid, guarantees the ghost vehicle efficiency.

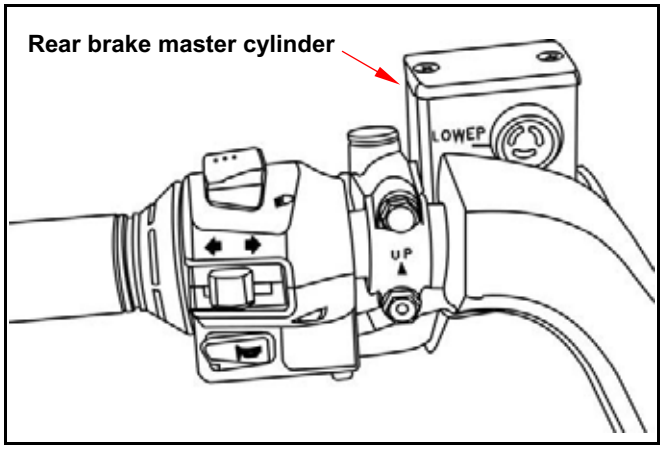
Adding Brake Fluid

Before the brake fluid reservoir is removed, turn the handle so that the brake fluid reservoir becomes horizontal, and then remove the brake fluid reservoir.
When maintenance brake system, will be supposed to paint the surface or the rubber parts catches up by the rags.

Caution

- Supplement brake fluid please do not surpass the upper limit, spilled brake fluid on painted surfaces, plastic or rubber components may result in their damages.

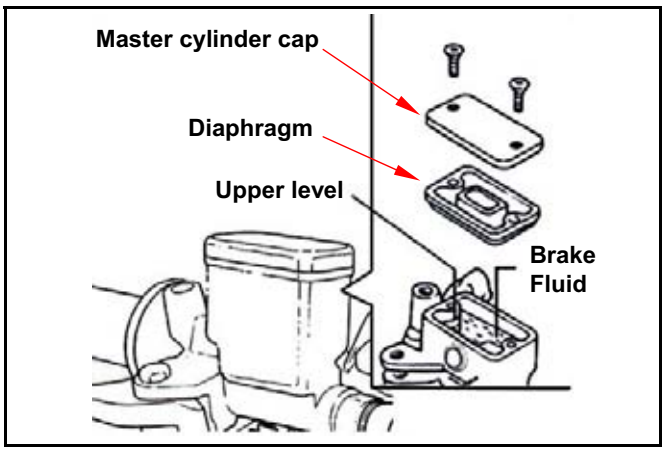




Remove the master cylinder cap and diaphragm.
Increases the high quality brake fluid, uses by all means must with the trade mark brake fluid joins in the master cylinder.
Clean the dirty brake disk.

Caution

- The dirty brake lining or disk will reduce the brake performance.
- To mixed non-compatible brake fluid will reduce brake performance.
- Foreign materials will block the system causing brake performance to be reduced or totally lost.



Brake fluid replacement

Connect drain hose to brake bleeder valve.
Open the valve on the calipers and delay valve the brake lever until the old brake fluid is entirely drained out.
Close the valve and add specified brake fluid into the brake master cylinder.
Recommended brake fluid: WELLRUN DOT 3 brake fluid
Connect one end of transparent hose to the drain valve, and put the other end into a container.
Open the valve around 1/4 turns, and at the same time hold the brake lever until the there is no air bubble in the drain hose and also feeling resistance on the brake lever.
Close the valve when finishing the brake system refilling fluid procedure, and operate the brake lever to check whether air bubble is in brake system or not.
If brake is still soft, please bleed the system as described below:

1. Tightly hold the brake lever and open the valve around 1/4 turns, and then close the valve.

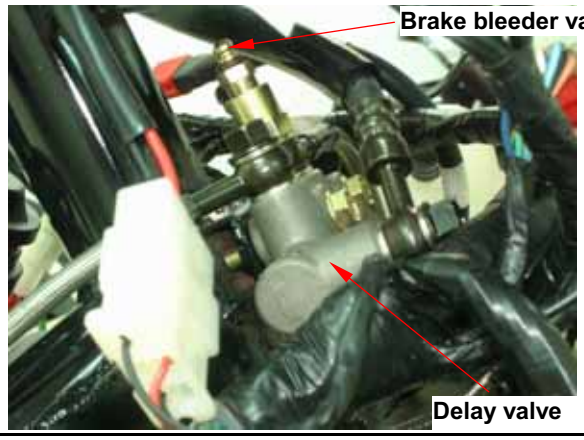
Caution

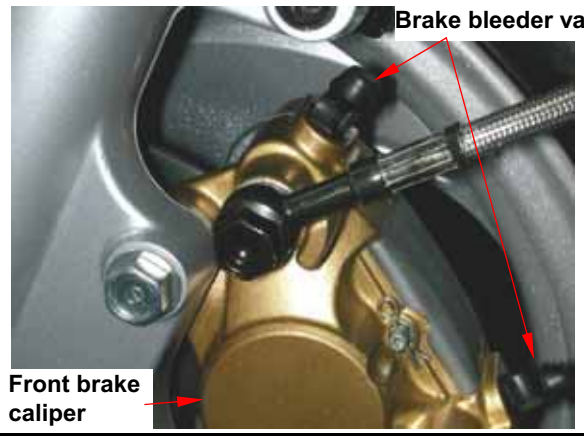
- Do not release the brake lever before the drain valve is closed.
- Always check the brake fluid level when carrying out the air bleeding procedure to avoid air enter into the system.

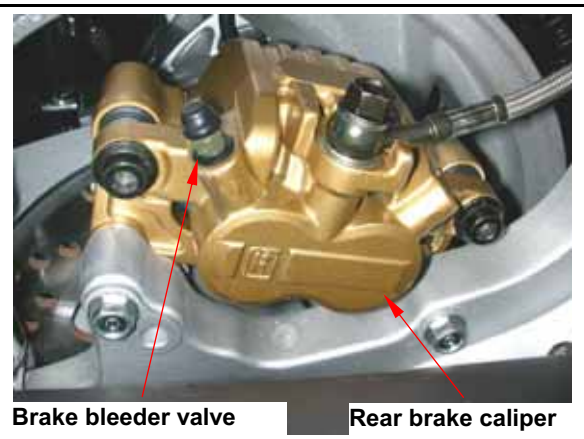
2. Slowly release the brake lever, and wait for a few seconds until it reaches its top position.
3. Repeat the steps 1 and 2 until there is no air bubble at the end of the hose.
4. Tightly close the drain valve.
5. Make sure the brake fluid is in the UPPER level of the master cylinder, and refill the fluid if necessary.
6. Cover the cap

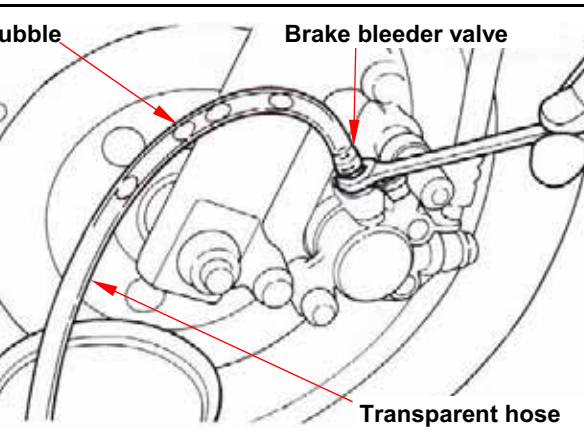
Caution

- Divulges the air to have to pump by the minute first divulges, then to caliper.
- May use fluid the replacement machine, the replacement fluid, the time is quicker, the air bubble also Compared with cannot remain









Front Brake Caliper

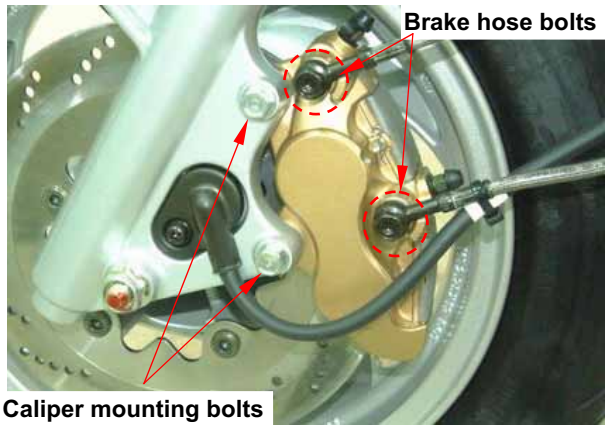
Removal

Place a container under the brake caliper, and loosen the brake hose bolts and finally remove the brake hoses.

⚠ Caution

- Do not spill brake fluid on painted surfaces.

Remove two caliper mounting bolts and the caliper.



Installation

Install the brake caliper and tighten the mounting bolts.

Torque: 2.9~3.5kgf-m

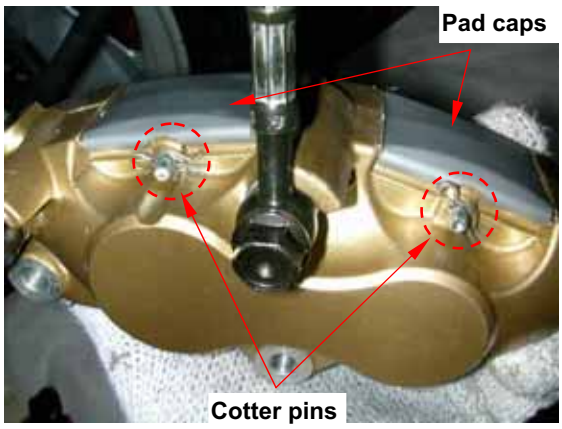
⚠ Caution

- Use M8 x 35 mm flange bolt only.
- Long bolt will impair the operation of brake disk.

Use two seal washers and hose bolts to lock the hoses and brake caliper in place.

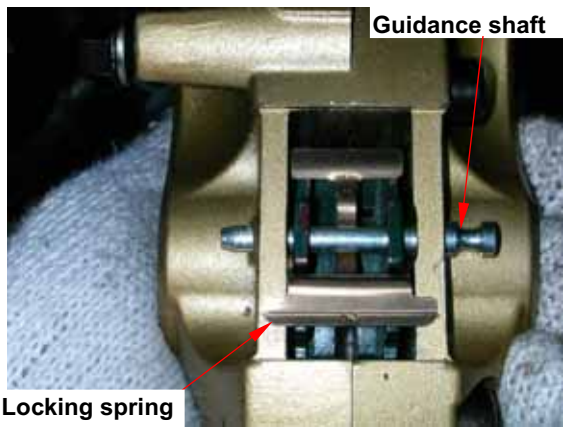
Torque: 3.0~4.0kgf-m

Refill up the brake fluid to the reservoir and make necessary air bleeding.



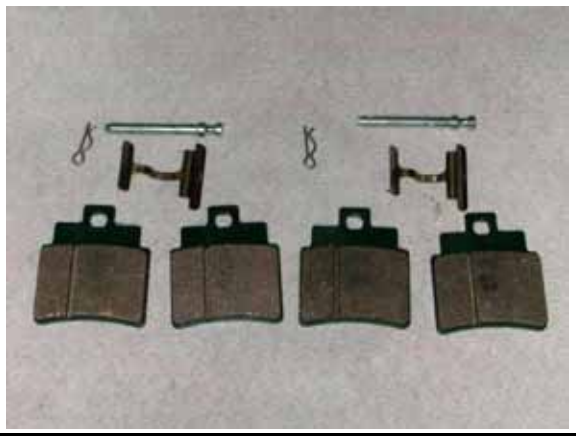
Brake pad replacement

Remove brake caliper.
Remove brake pad caps.
Remove the brake pad guidance shafts cotter pins.



Remove the brake pad guidance shafts and locking spring, and then remove brake pads.

Install the new brake pads onto brake caliper.
Install the brake pad guidance shafts and locking springs.
Install the brake pad guidance shafts cotter pins.
Install the brake caliper and tighten the mounting bolts.



Rear Brake Caliper

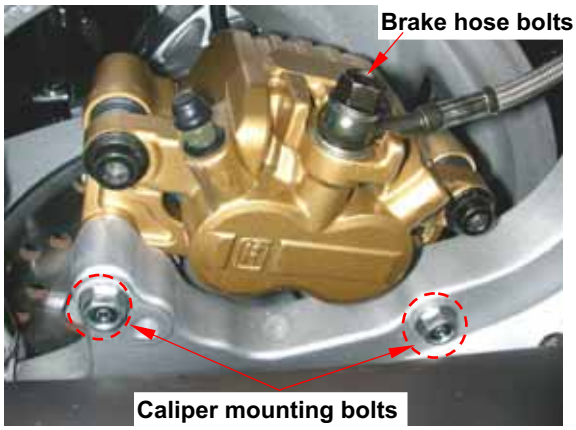
Removal

Place a container under the brake caliper, and loosen the brake hose bolt and finally remove the brake hose.

⚠ Caution

- Do not spill brake fluid on painted surfaces.

Remove two caliper mounting bolts and the caliper.



Installation

Install the brake caliper and tighten the mounting bolts.

Torque: 2.9~3.5kgf-m

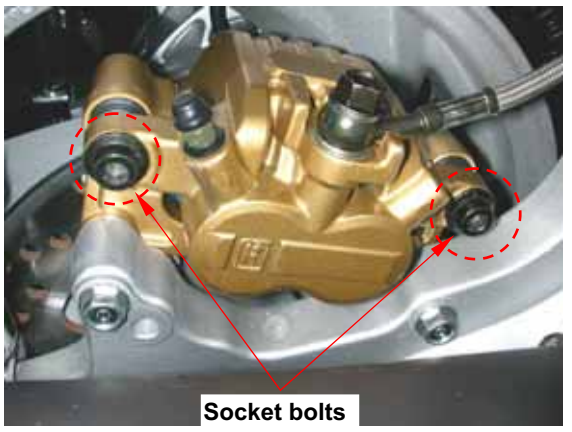
⚠ Caution

- Use M8 x 35 mm flange bolt only.
- Long bolt will impair the operation of brake disk.

Use two seal washers and hose bolts to lock the hoses and brake caliper in place.

Torque: 3.0~4.0kgf-m

Refill up the brake fluid to the reservoir and make necessary air bleeding.



Brake pad replacement

Remove the brake caliper upper parts (2 socket bolts).

Take out the brake pads.

Install the new brake pads onto brake caliper bracket.

Install the brake caliper upper parts and tighten the socket bolts.

Brake Disk

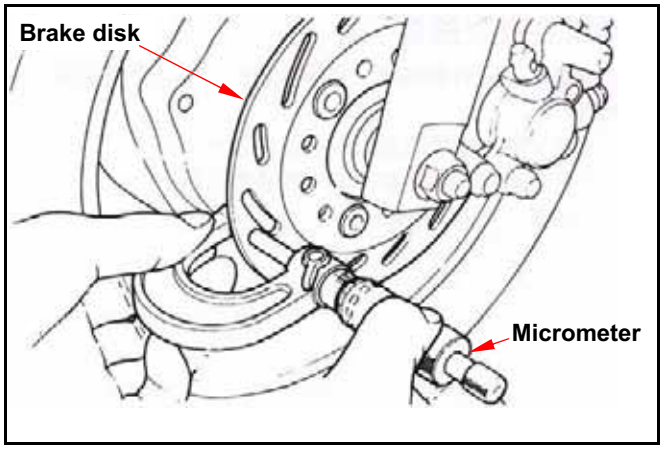
Inspection

Visually check the brake disk for wear or break. Measure the thickness of the disk at several places. Replace the disk if it has exceeded the service limit.

Allowable limit:

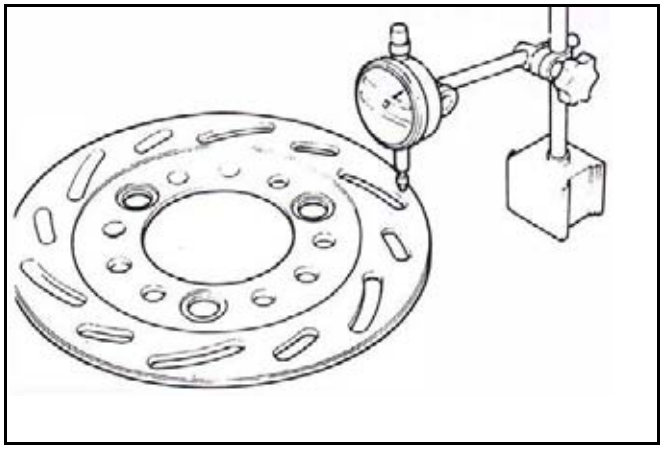
Front brake disk 2.5 mm

Rear brake disk 3.5 mm



Remove the brake disk from wheel.
Check the disk for deformation and bend.

Allowable limit: 0.30 mm



⚠ Caution

- The dirty brake lining or disk will reduce the brake performance.
- Brake lining includes the asbestos ingredient, cannot use the air-gun to be clean, the operator should dress the mouthpiece and the glove, use vacuum cleaner clean it.

Master Cylinder

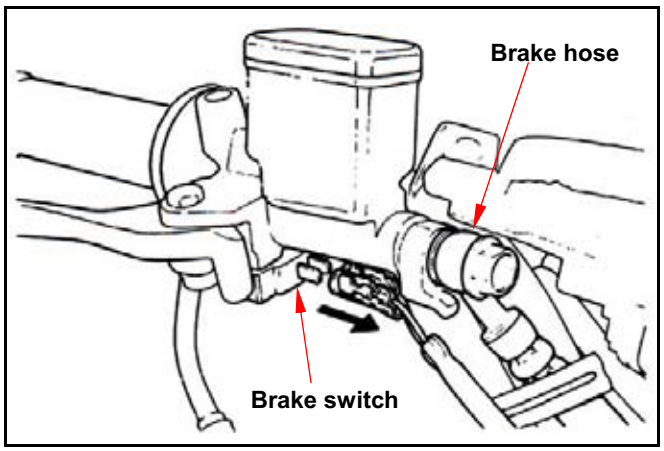
Master Cylinder Removal

⚠ Caution

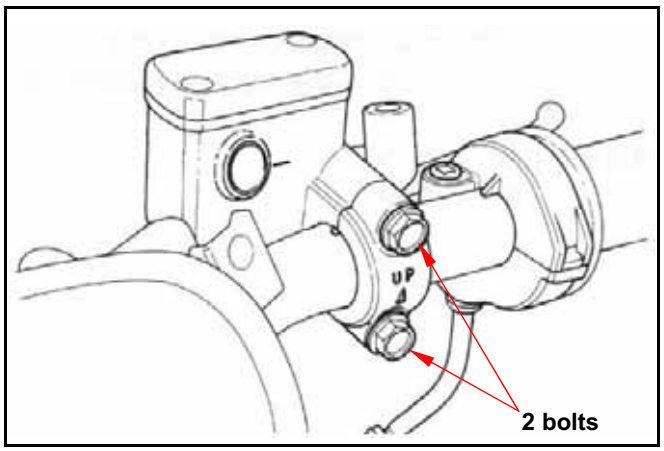
- Do not let foreign materials enter into the cylinder.

⚠ Caution

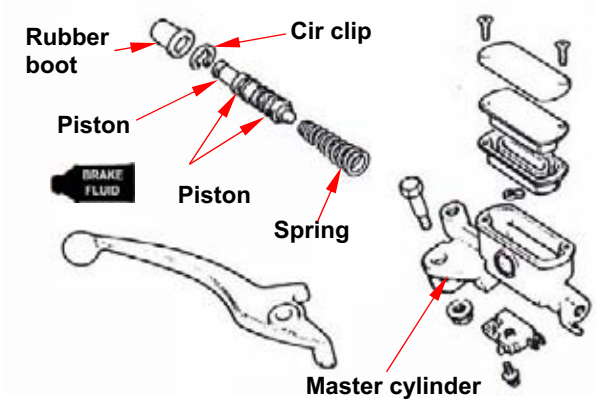
- The whole set of master cylinder, piston, spring, diaphragm and cir clip should be replaced as a set.



Remove the handlebar covers.
Remove the leads of brake light switch.
Drain out the brake fluid.
Remove the brake lever from the brake master cylinder.
Remove the brake hose.
Remove the master cylinder bolts and the master cylinder.

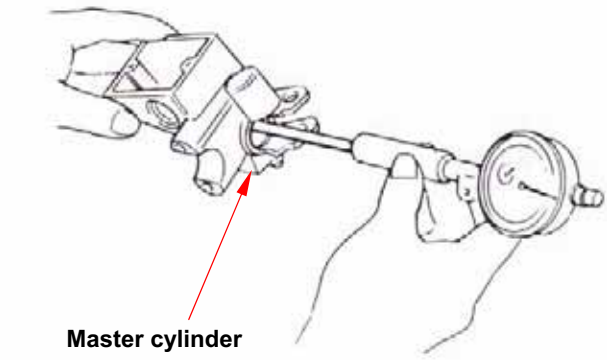


Remove the rubber pad.
Remove the cir clip.
Remove the piston and the spring.
Clean the master cylinder with recommended brake fluid.



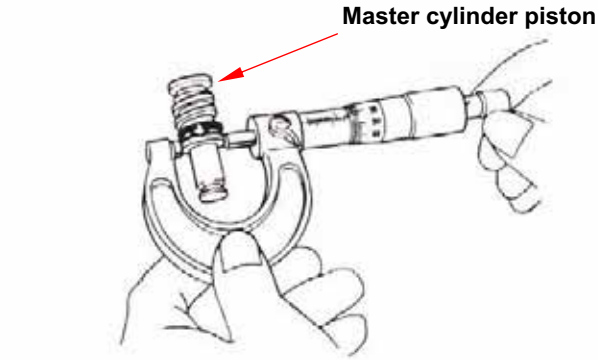
Master Cylinder Inspection

Check the master cylinder for damage or scratch. Replace it if necessary.
Measure the cylinder inner diameter at several points along both X and Y directions.
Replace the cylinder if the measured values exceed allowable limit.
Allowable limit:
Front brake: 11.055 mm
Rear brake: 14.055 mm



Measure the outer diameter of the piston.
Replace the piston if its measured value exceeds allowable limit.

Allowable limit:
Front brake: 10.945 mm
Rear brake: 13.945 mm

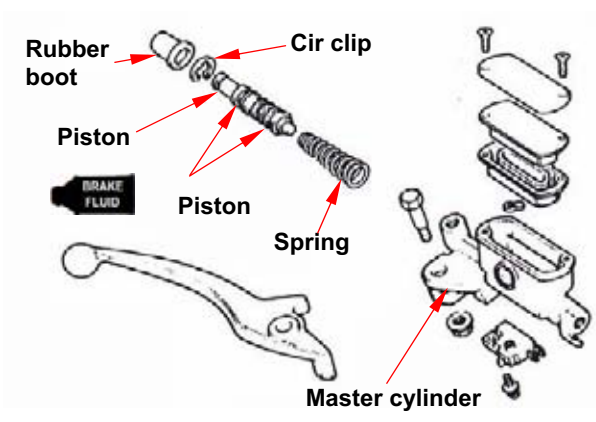


Master Cylinder Assembly

⚠ Caution

- It is necessary to replace the whole set comprising piston, spring, piston cup, and cir clip.
- Make sure there is no dust on all components before assembling.

Apply clean brake fluid to the piston cup, and then install the cup onto the piston.
Install the larger end of the spring onto the master cylinder.
The master cup's cavity should be face inside of master cylinder when installing the master cup.
Install the cir clip.



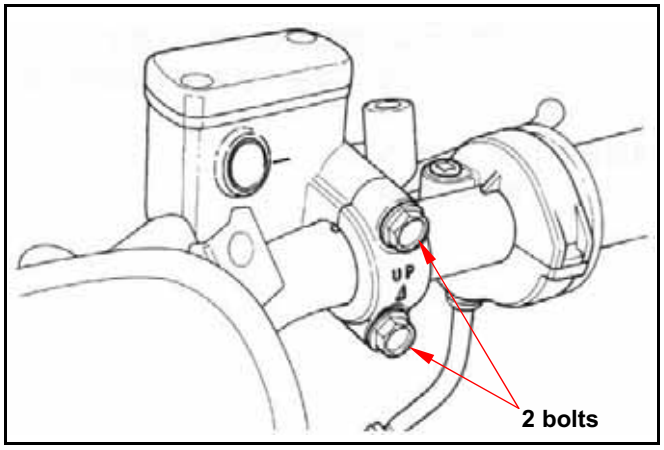
⚠ Caution

- Never install cup lip in the opposite direction.
- Make sure the cir clip is seated securely in the groove.

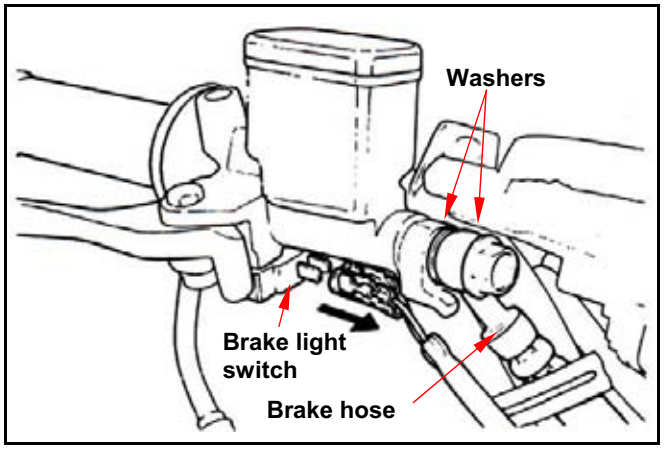
Install the rubber pad into groove properly.

Master Cylinder Install

Install the rubber pad into the groove correctly.
Place the master cylinder onto handlebar, and install the bolts.
Install the brake lever, and connect leads to brake light switch.



Connect brake hoses with 2 new washers.
Tighten the brake hose bolt to the specified torque value.
Make sure the hose is installed correctly.
Install all wires, hoses, and components carefully so avoid to twisting them together.



⚠ Caution

- Improper routing may damage leads, hoses or pipes.

⚠ Caution

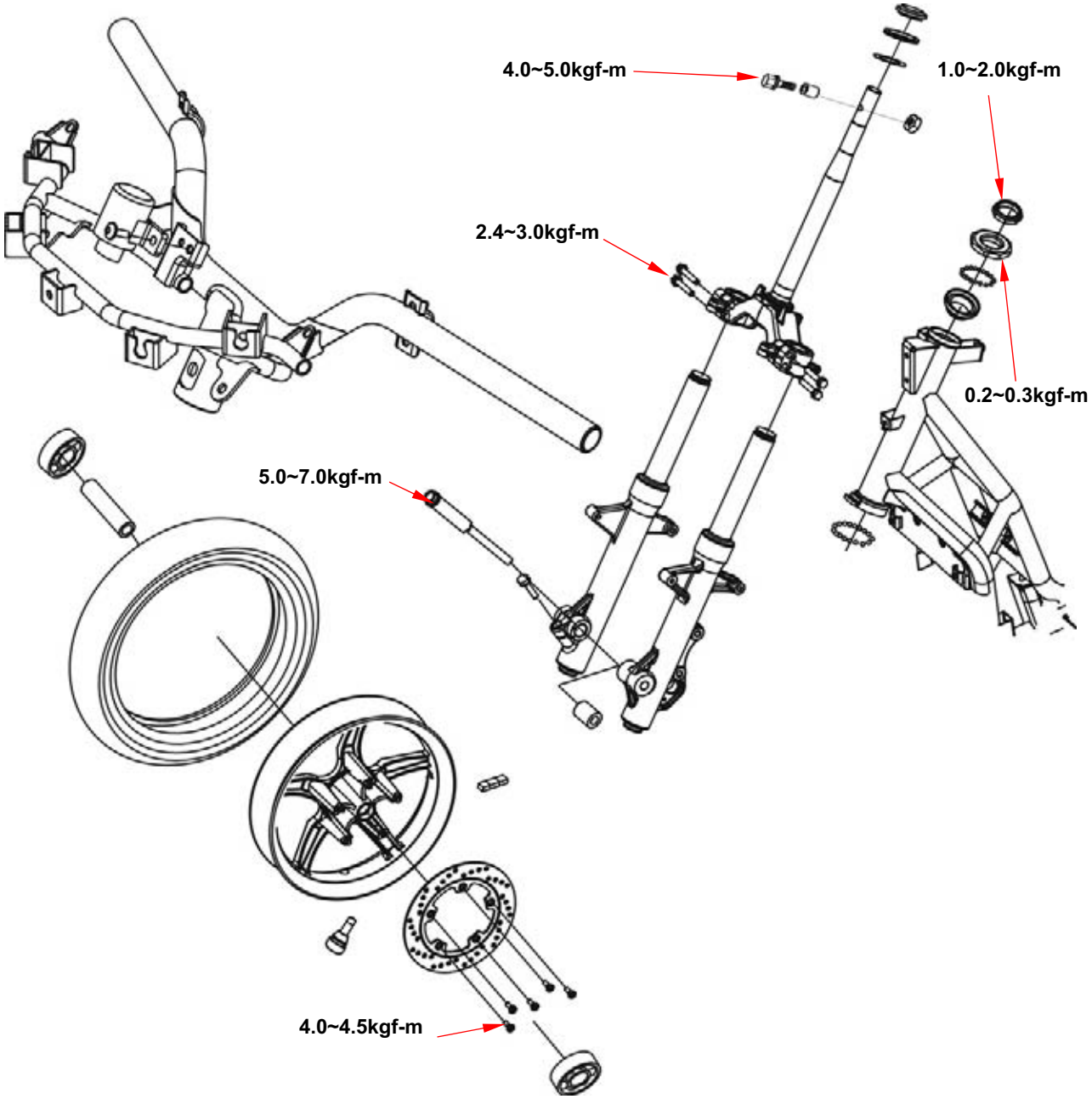
- Kink of brake leads, hose or pipe may reduce brake performance.

Add specified brake fluid and bleed the system.

Note:

Mechanism Diagram ····· 15-1	Front Wheel ····· 15-5
Operational Precautions ····· 15-2	Front Cushion ····· 15-8
Trouble Diagnosis ····· 15-2	Steering Stem ····· 15-9
Steering Handle ····· 15-3	

Mechanism Diagram



Operational Precautions

General

Please refer to the Maintenance Manual of tubeless tire in respect to the removal, repair and installation of the tire.

Torque Values

Nut for the front wheel axle	5.0 ~ 7.0kgf-m
Nut for the steering handle	4.0 ~ 5.0kgf-m
Lock nut for the steering handle stem	1.0 ~ 2.0kgf-m
Top crown for the steering handle stem	0.2 ~ 0.3kgf-m
Locating screw for the speedometer cable	0.15 ~0.3kgf-m
Front cushion upper lock bolt	2.4 ~ 3.0kgf-m
Front brake disk	4.0~4.5kgf-m

Special Tools

Steering handle top thread wrench	SYM-5320000、SYM-5321100
Inner bearing puller	SYM-6204020
Steering nut wrench	SYM-6204010
Driver 32*35mm	
Driver 42*47mm	

Trouble Diagnosis

Hard to steer

- The steering handle stem nut is too tight.
- The ball and the top crown of the steering handle stem are damaged.
- Insufficient tire pressure.

The steering handlebar is tilted

- Uneven arrangement of the front cushion.
- The front fork is bent.
- The front wheel axle is bent

The front wheel rim run-out

- The rim is bent.
- The wheel axle nut is not tightened enough.
- Side-worn or poor tire.
- The bearing clearance of the wheel axle is too large.

Soft front cushion

- The front cushion spring is worn out.
- The oil seal of the front cushion is leaking.

Noise in front cushion

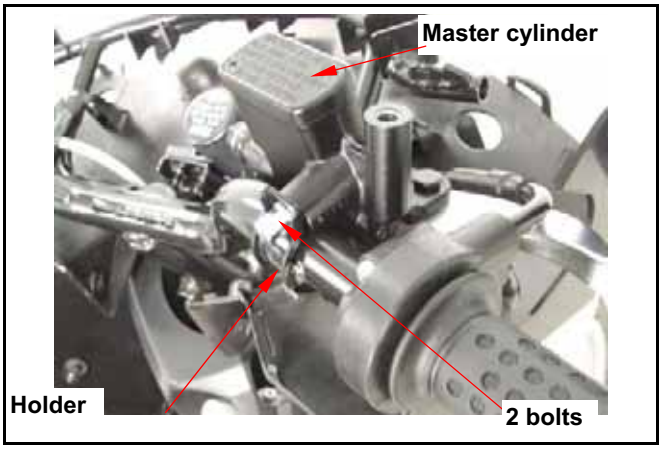
- Front cushion is warped.
- The joint of the front cushion gets loose.

Steering Handle

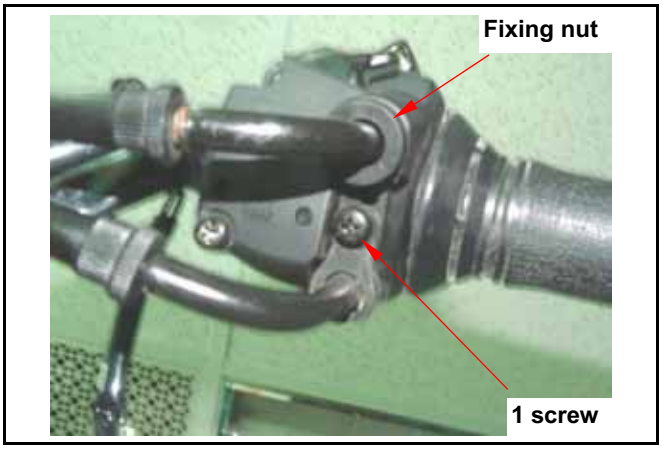
Remove

Remove the right and left handle side cover, handle upper cover and front cover. (Refer to chapter 13)

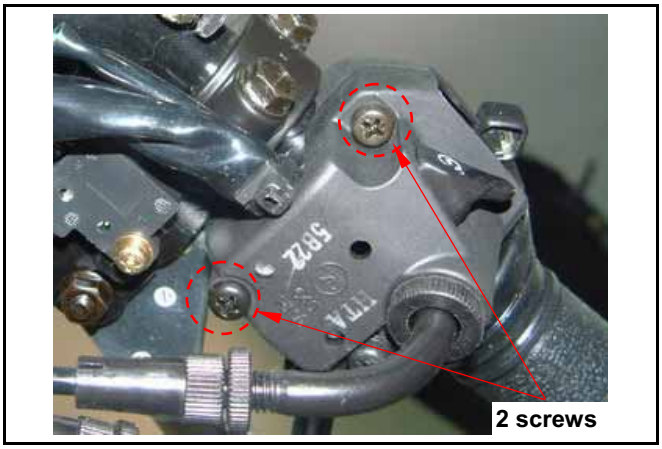
Loosen the lock bolts for the master cylinder of the front brake.



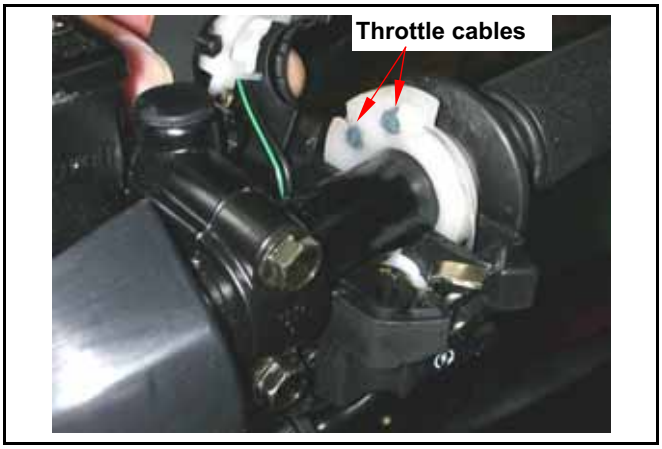
Loosen the deceleration throttle cable fixing nut.
Loosen 1 screw from the acceleration throttle fixing plate.



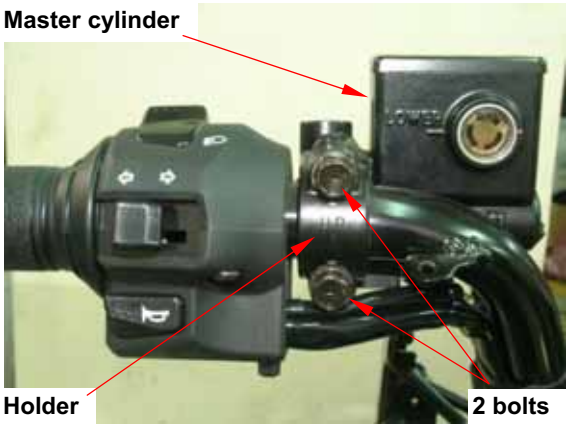
Loosen 2 screws from the throttle holder.



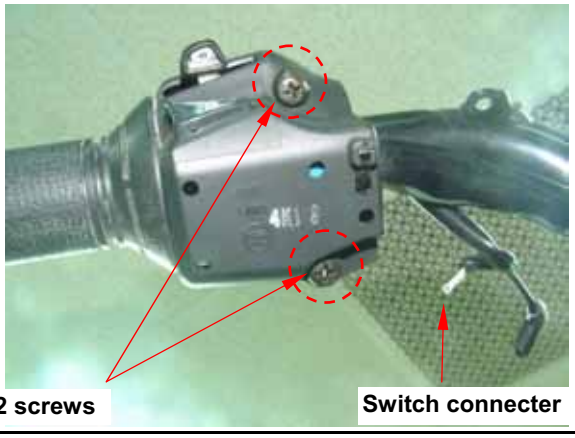
Remove throttle holder, handle switch, cables and grip.



Loosen 2 bolts from the master cylinder of the rear brake.
Remove holder and master cylinder.



Loosen left handle switch connecter.
Loosen 2 screws from left side handle switch holder.
Remove the right handle switch.



Loosen handle mounting nut.
Remove handle mounting bolt, and then remove the handle.

Installation

Install handle and align with bolt hole.
Install bolt and nut and then tighten it.
Torque value: 4.0~5.0kgf-m

Apply with grease onto throttle cable and the sliding surface of handle.
Align the lock pin with the hole on the handle.
After the installment completes, carries on the following inspection and the adjustment:

- Throttle grip operation.
- All electric appliances, the meter function

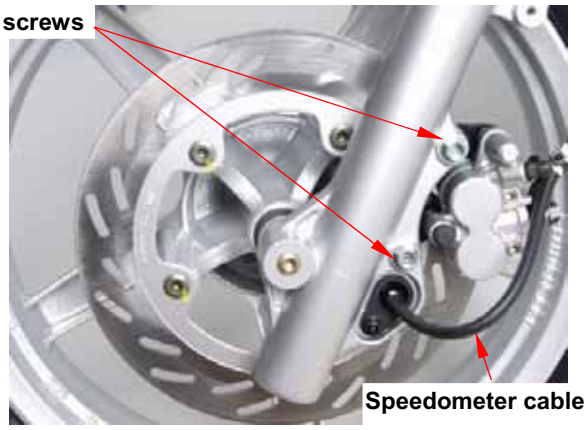
Front Wheel

Loosen 2 bolts from the front brake caliper and remove it

⚠ Caution

- Care shall be taken not to push the brake lever to avoid the brake pad being squeezed out. In case that the brake pad is accidentally squeezed out, use a screwdriver to force it back to the place.

Loosen screw & remove speedometer cable.
Turn loose the axle nut.



Loosen the socket bolt and front axle from light side front cushion.

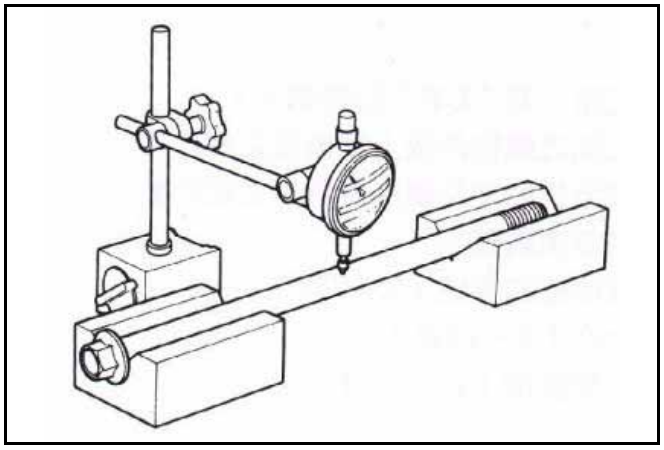
Pull out the front wheel axle.
Remove the front wheel and both side collar.

Inspection

Wheel axle

Place the wheel axle on a V block, measure its run out.

Service limit: 0.2 mm

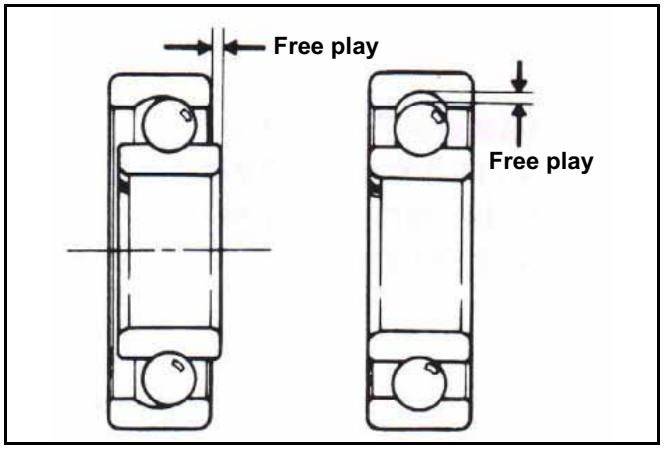


Bearing

Use finger to move the inner ring of each bearing, it shall move smoothly and quietly. Check the outer ring is securely attached on the wheel hub. If the motion of the inner ring of the bearing is not smooth, or noisy and loose when being moved, remove and discard it.

⚠ Caution

- The bearing shall be replaced in pair.



Wheel

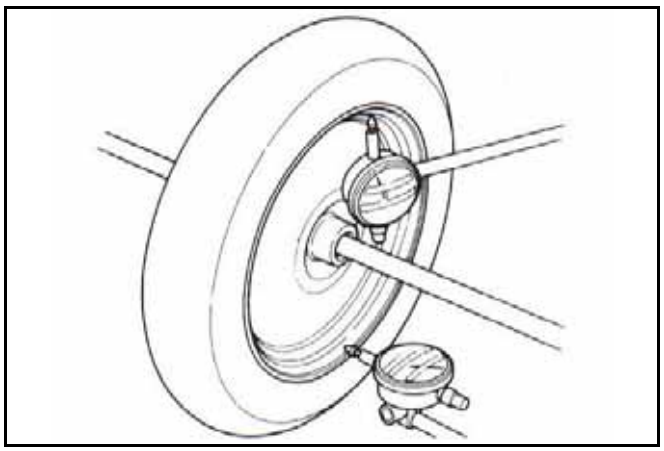
Place the wheel on to a rotation seat to check its rim wobbling.

Turn the wheel with hand and measure its rim wobbling value with a dial gauge.

Service limit:

Radial: 2.0 mm (0.08 in)

Axial: 2.0 mm (0.08 in)



Disassembly

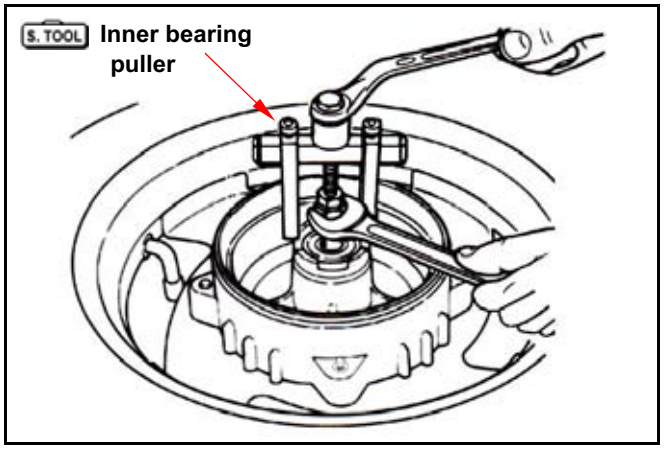
Remove brake disk (5 bolts).

Remove dust seal, bearing and dist collar from left side.

Remove dust seal and bearing from right side.

Special tools:

Inner bearing puller SYM-6204020

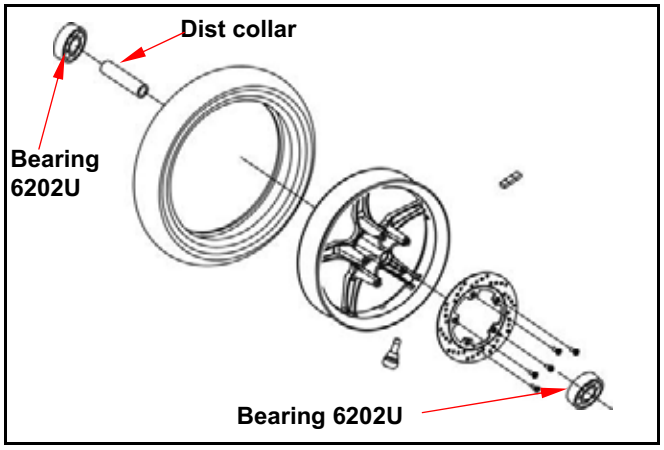


Assembly

Fill out the block of bearing by grease.
Drive the left bearing, dust seal and install the dist. collar.
Install the right side bearing.

⚠ Caution

- Carefully install the bearing in correct and evenly.
- Bearing outer face should be faced up as bearing installation.



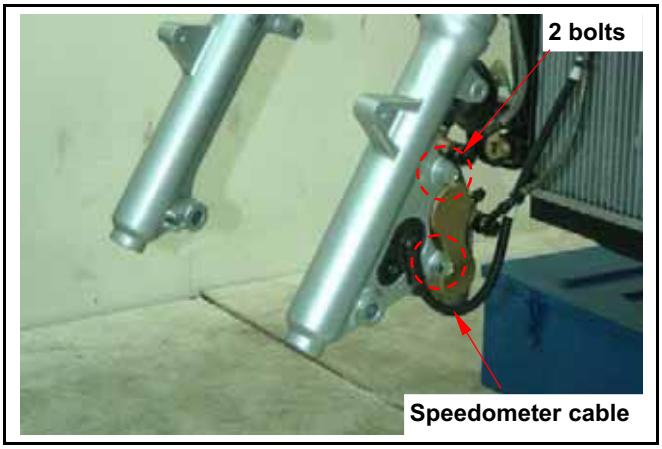
Install the brake disk and then tighten the bolts.

Torque value: 4.0~4.5kgf-m

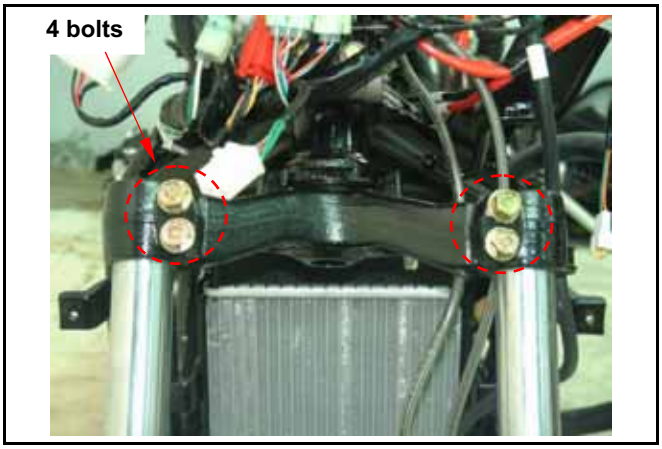
Front Cushion

Remove

Remove front cover, front under spoiler and front fender.
Remove front wheel.
Remove front brake caliper.
Remove speedometer cable.



Loosen 4 bolts from steering stem.
Remove the front cushions.

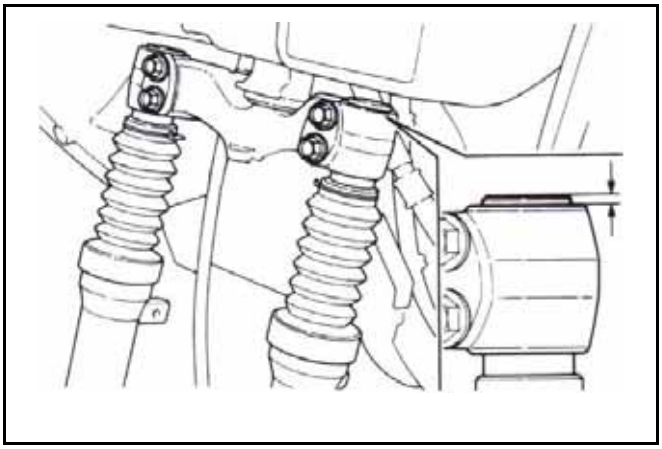


Installation

Align the cover flange with upper level of the cushion clamp, and then tighten bolts.

Torque value: 2.4~3.0kgf-m

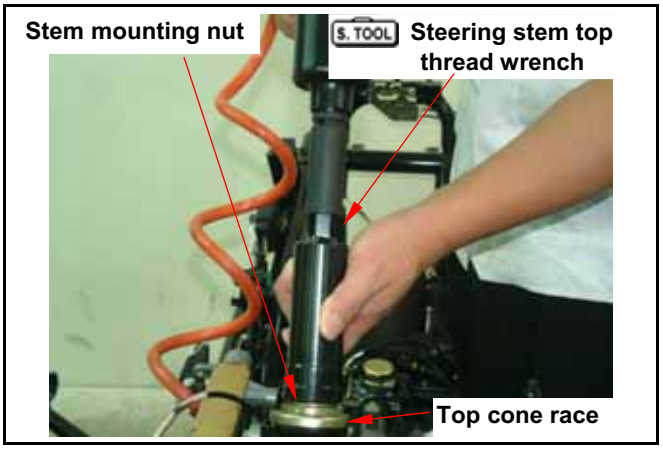
Install the removed components in reverse order of removal procedures.



Steering Stem

Remove

Remove handle, front wheel and front cushion.
Remove the steering stem mounting nut.

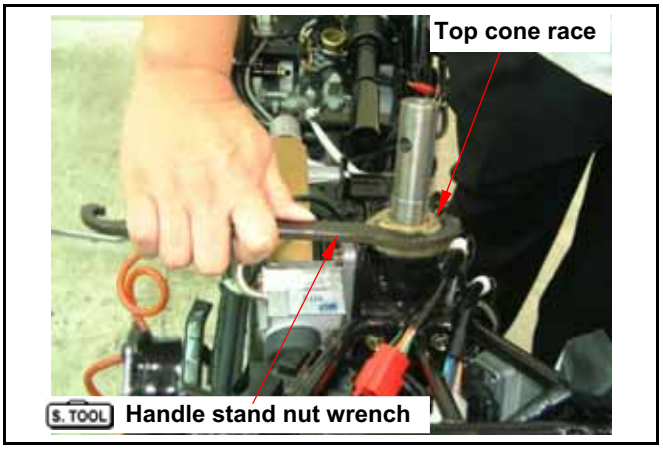


Remove top cone race and steering stem.

⚠ Caution

- Place the steel ball onto a parts container to prevent from missing.

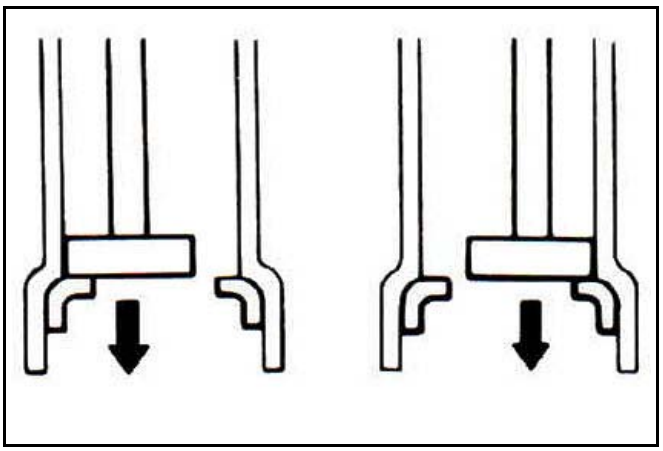
Special tools:
Steering stem top thread wrench SYM-5320010
Handle stand nut wrench SYM-5321100



Slightly tap the top and bottom ball bearing seats with a plastic hammer to remove the seats.
Remove bottom cone race body with a punch.

⚠ Caution

- Do not damage the steering stem.



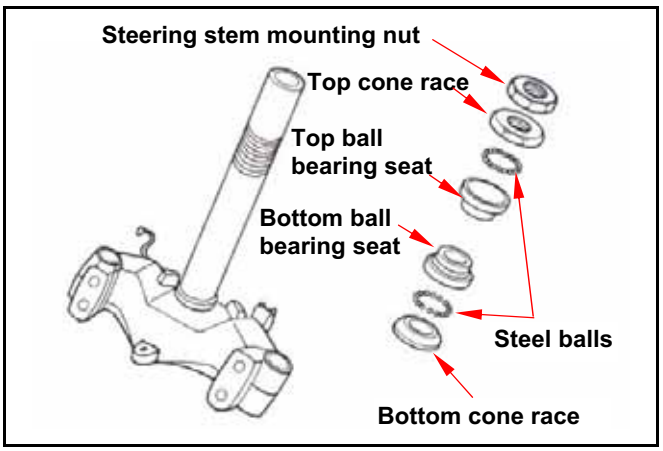
Installation

Install a new bottom cone race onto the steering stem.
Push the cone race until to mounted position.

⚠ Caution

- Do not tilt the ball bearing seats as installation.

Apply with grease onto the ball bearing seats, and install steel balls onto the seats.(Top: 26 balls, bottom: 29 balls)

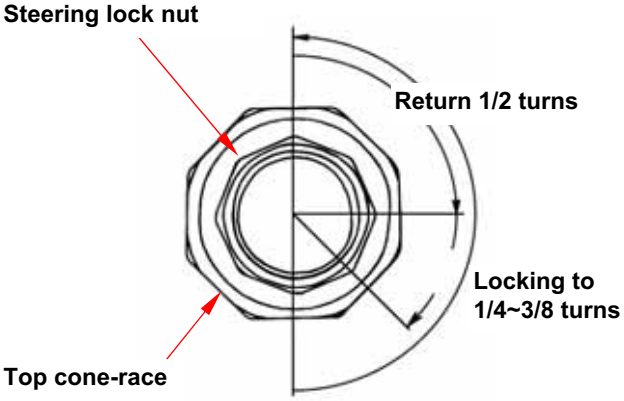


Lubricate the top cone race seat with grease. Screw the cone race in to top ball bearing seat till touching, and then screw out the cane race 1/4~3/8 turns.

Torque value: 0.25kgf-m

⚠ Caution

- Check the steering stem that should be rotated freely and no clearance in vertical direction.



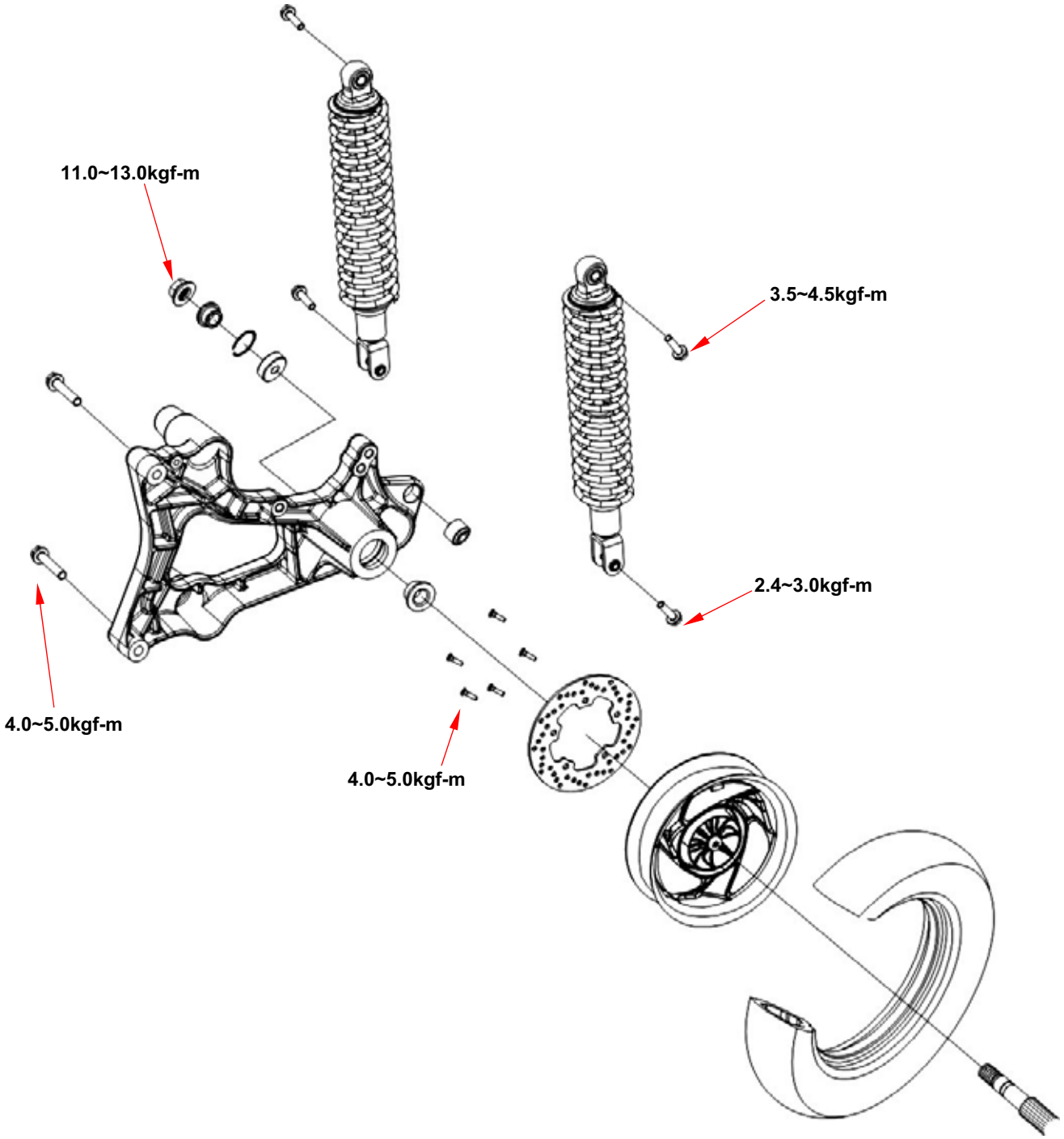
Install the steering stem mounting nut and tighten the nut by means of holding the top cone race body.

Torque value: 1.0~2.0kgf-m

Install in reverse order of removal procedures.

Mechanism Diagram ····· 16-1	Rear Wheel ····· 16-3
Operational Precaution ····· 16-2	Rear Fork ····· 16-5
Trouble Diagnosis ····· 16-2	Rear Cushion ····· 16-6
Muffler ····· 16-3	

Mechanism Diagram



Operational Precaution

General

Please refer to the Maintenance Manual for tubeless tire in respect to the removal, repair and installation of the tires.

Service data **Unit: mm**

Item		Standard	Allowable Limit
Run-out of rear rim	Radial	-	2.0
	Axial	-	2.0

Torque Value

Rear wheel axle nut	11.0~13.0kgf-m
Rear cushion upper bolt	3.5~4.5kgf-m
Rear cushion under bolt	2.4~3.0kgf-m
Rear fork mounting bolt	4.0~5.0kgf-m
Exhaust muffler mounting nut	1.0~1.2kgf-m
Exhaust muffler mounting bolt	3.2~3.8kgf-m
Brake clipper mounting bolts	2.9~3.5kgf-m
Brake disc mounting bolt	4.0~5.0kgf-m

Trouble Diagnosis

Run-out of rear wheel

- Deformed or bent wheel hub.
- Improper tires.
- Loose wheel shaft.

Soft Cushion

- The spring is too weak.

Noisy Brake

- Worn brake lining.
- Offset brake disc.
- Improper assembly of brake caliper.
- Brake disc or wheel imbalance.

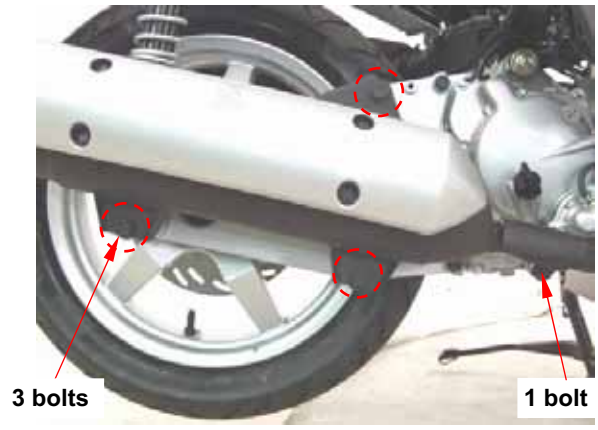
Poor Performance of Brake

- Improperly adjusted brake.
- Contaminated brake disc.
- Worn brake lining.
- Air inside brake fluid pipe.
- Grease on brake disc.
- The brake fluid piping is clogged.
- The brake fluid pipe is deformed or bent.
- The brake fluid pipe is deformed or bent.
- Insufficient amount of brake fluid in the reservoir

Muffler

Removal

Loosen the 1 mounting bolt by exhaust muffler front side.
Loosen the 3 mounting bolts by exhaust muffler right side.
Remove exhaust muffler.



Installation

Install in reverse order of removal procedures.

⚠ Caution

- Replace the front side muffler pipe gasket if worn or deformed.

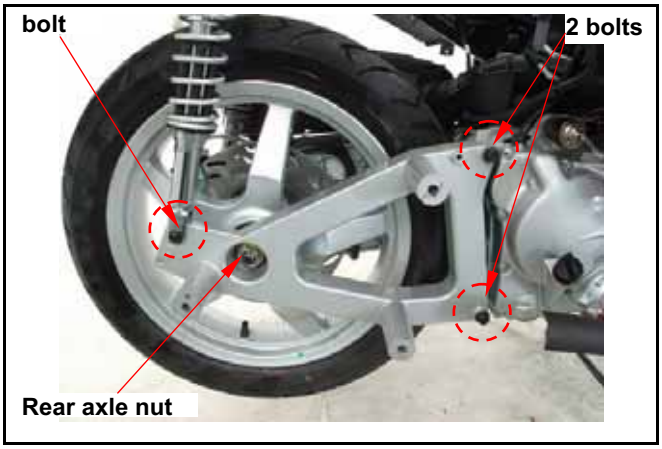
Torque Value:

Muffler mounting bolt	**3.2 ~ 3.8kgf-m**
Muffler mounting nut	**1.0 ~ 1.2kgf-m**

Rear Wheel

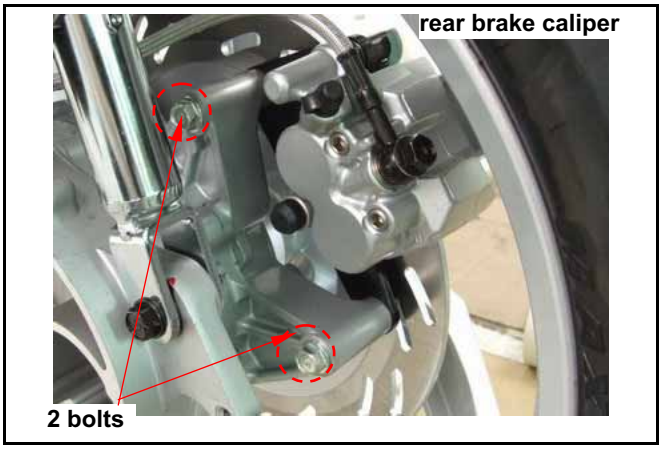
Removal

Remove the exhaust muffler.
Remove the lower bolt of the right side rear cushion.
Remove 2 bolts and rear axle nut of the rear fork.
Remove the rear brake caliper (2 bolts) and brake hose clamp (1 bolt).



⚠ Caution

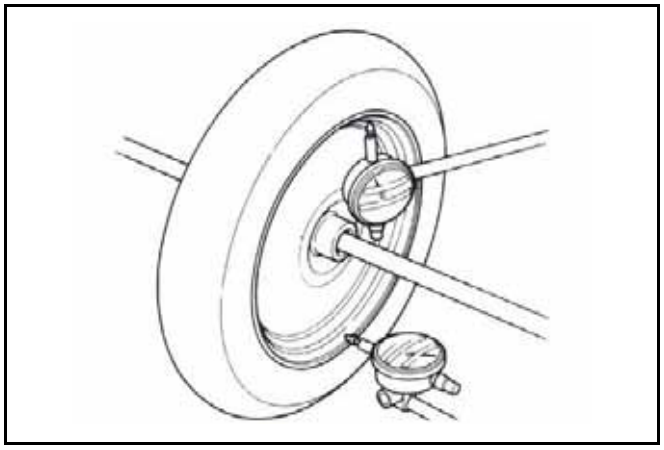
- Care shall be taken not to push the brake lever to avoid the brake pad being squeezed out. In case that the brake pad is accidentally squeezed out, use a screwdriver to force it back to the place.



Remove the rear wheel.

Inspection rear wheel rim

Place the wheel rim on a rotational support.
Rotate it by hand and measure the run-out with a dial indicator.
Run-out limit: 2.0 mm



Installation

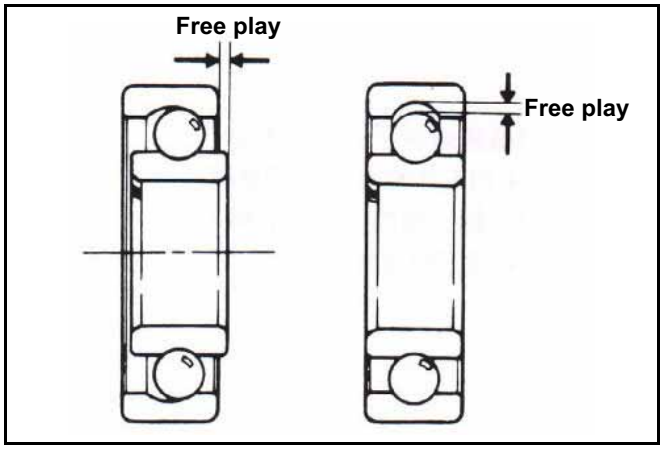
Install in reverse order of removal procedures.
Torque Value:

Rear wheel axle nut	**11.0~13.0kgf-m**
Rear cushion under bolt	**2.4~3.0kgf-m**
Rear fork mounting bolt	**4.0~5.0kgf-m**
Brake clipper mounting bolts	**2.9~3.5kgf-m**

Rear Fork

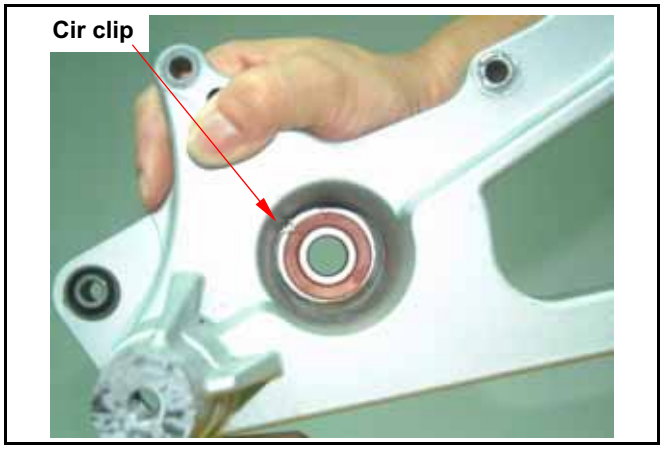
Inspection rear fork bearing

Rotate the inner ring of the bearing with a finger.
The bearing should move smoothly and quietly.
Check the fit of the bearing and rim.
Replace the bearing if its motion is not smooth or noisy.



Replacement of rear fork bearing

Remove the bearing lock cir clip.



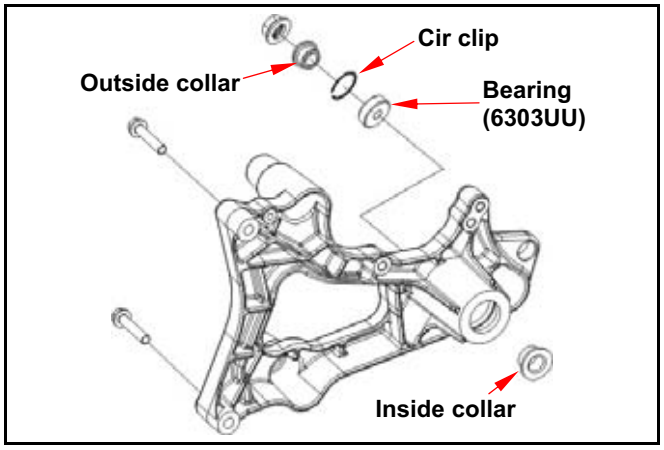
Uses the bearing driver; drive out the bearing.

Special tool: Bearing driver

Install new rear fork bearing and bearing puller (6303) onto rear fork.
Install assembly directs puller bearing puller.
Special Service Tools:
Rear fork bearing 6303 bearing puller
SYM-6303000-HMA H9A 6303
Assembly directs puller SYM-2341110

Use screw driver hold bearing puller lower part, and turn the bearing puller upper part to install the rear fork bearing.

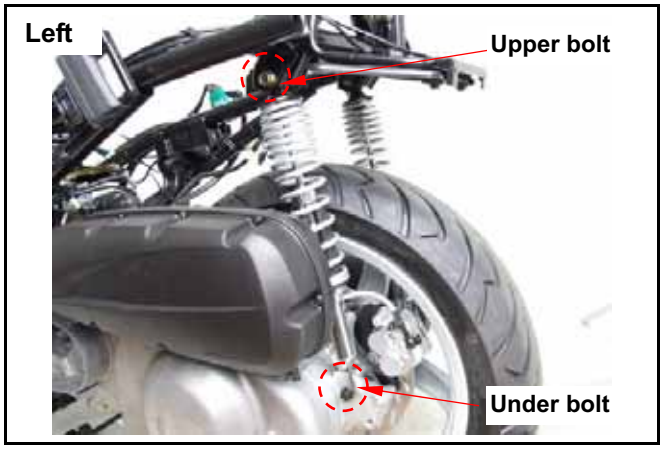
Install the bearing lock cir clip.



Rear Cushion

Removal

Remove the luggage box, rear carrier and body covers.
Loosen the mounting bolts of the air cleaner (2 bolts).
Remove the exhaust muffler (3 bolts, 2 nuts).
Remove the under bolts by left and right rear cushions.
Remove the upper bolts by left and right rear cushions, and then remove the cushion.

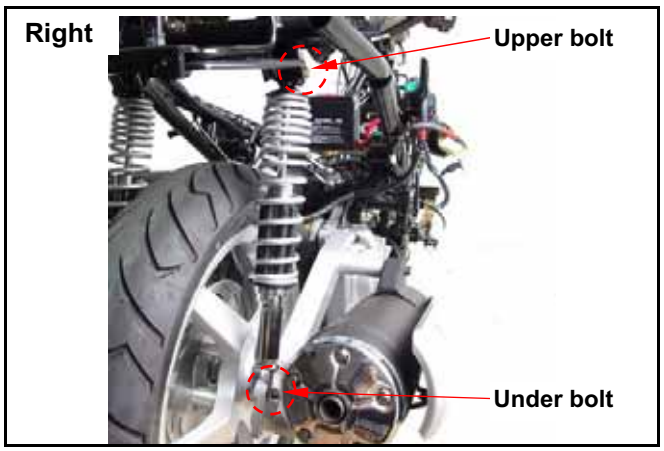


Installation

Install in reverse order of removal procedures.

⚠ Caution

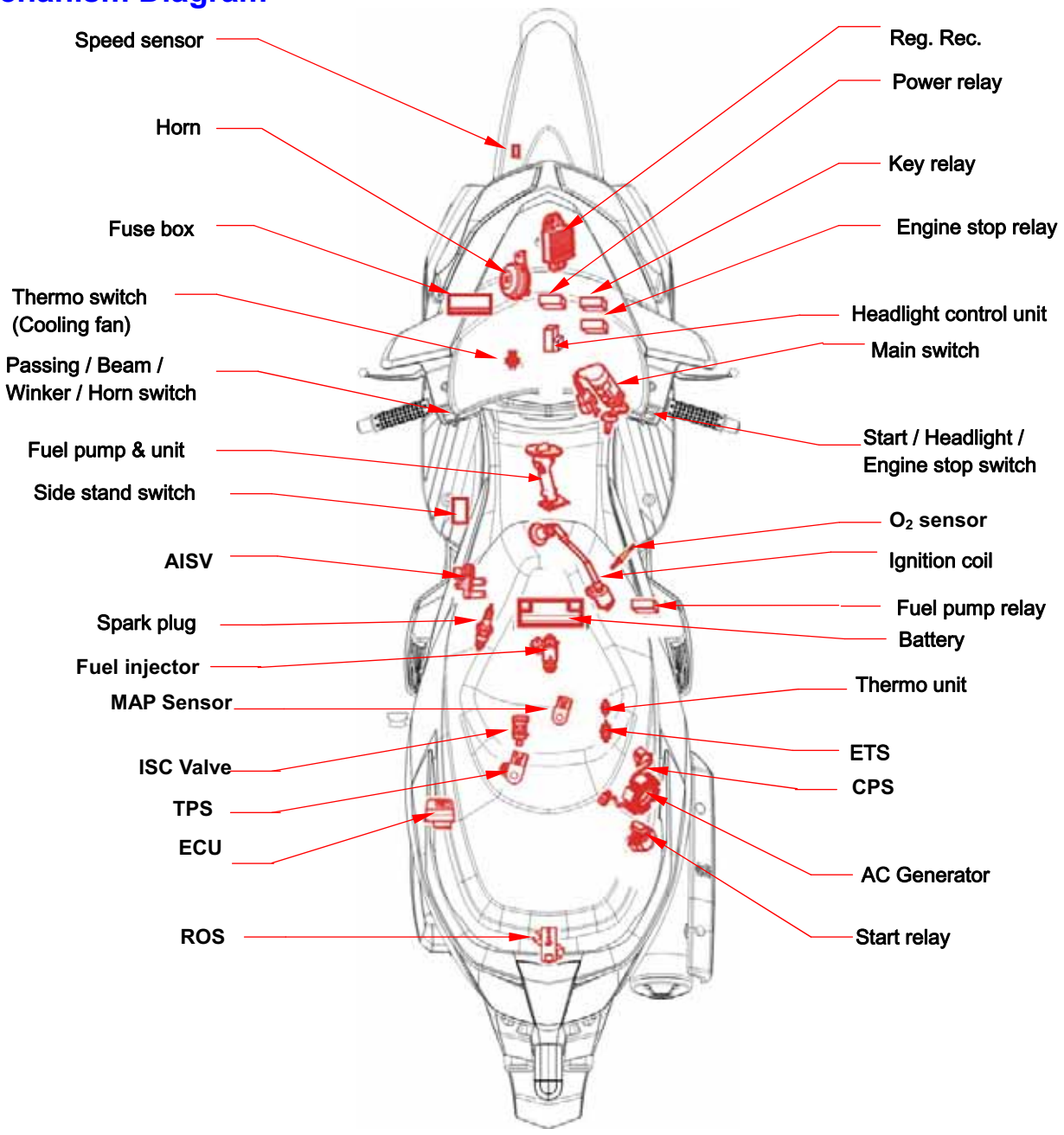
- The rear cushion must be replaced as a unit. Never disassemble the rear cushion as that would damage the structure.



Torque Value
Rear cushion upper bolt: 3.5~4.5kgf-m
Rear cushion under bolt: 2.4~3.0kgf-m

Mechanism Diagram-LH30W ····· 17-2	Starting System ····· 17-11
Maintenance Data ····· 17-2	Meters ····· 17-13
Technical Specification ····· 17-2	Light / Bulb ····· 17-15
Trouble Diagnosis ····· 17-3	Switch / Horn ····· 17-18
Battery ····· 17-4	Fuel Unit ····· 17-20
Fuse ····· 17-5	Cooling Fan Thermo Switch ····· 17-21
Charging System ····· 17-6	Thermo Unit ····· 17-22
Ignition System ····· 17-9	Water Temperature Meter ····· 17-22

Mechanism Diagram



Maintenance Data

Operational precaution

- When remove the battery, the disconnection sequence of cable terminals shall be strictly observed. (First disconnect the negative cable terminal, next, the positive cable terminal.)
- The model of the spark plug and the tightening torque.
- The ignition timing.
- Adjustment of headlight.
- Removal and installation of AC generator.
- The maintenance free battery requires no inspection of electrolyte level and refilling of distilled water.
- To recharge the battery, remove the battery from rack without removing ventilation caps.
- Unless in emergency, never rapid charge the battery.
- The voltage must be checked with the voltmeter while charging the battery.
- As ECU does not require an ignition timing check. In case ignition timing is incorrect, check ECU and AC generator. Verify with an ignition timing light after replacement if necessary.

Technical Specification

Charging System

Description		Specification
Battery	Capacity	12V10Ah
	Charging rate	1.2A / 5~10hr (standard) 5A / 1hr (fast charging)
Leak current		Below 1mA
Charging current		1.2A / 1500 rpm
Control voltage in charging		14.5+0.5 V / 2,000 rpm

Ignition System

Description		LH30W
Spark Plug	Model	NGK CR8E
	Gap	0.6~0.7 mm
Ignition Coil Resistance	Primary Winding	2.8±15% Ω
CPS resistance (20℃)		80~160 Ω
Ignition Timing	”F” mark	10° BTDC / 1650 rpm
	Advanced degree	30° BTDC (Full Advanced degree)

Trouble Diagnosis

No voltage

- Battery discharged
- The cable disconnected
- The fuse is blown
- Improper operation of the main switch
- Low voltage
- The battery is not fully charged
- Poor contact
- Poor charging system
- Poor voltage regulator

No spark produced by spark plug

- The spark plug is out of work
- The cable is poorly connected, open or short-circuited
- Between AC Generator ECU
- Poor connection between ECU and ignition coil
- Poor connection between ECU and the main switch
- Bad main switch
- ECU malfunctions
- AC Generator malfunctions

Starter motor does not work

- The fuse is blown
- The battery is not fully charged
- Bad main switch
- Bad starter switch
- The front or rear brake switches does not function correctly
- Starter relay is out of work
- The ignition coil is poorly connected, open or short-circuited
- The starter motor malfunctions

Intermittent power supply

- The connector of the charging system becomes loose
- Poor connection of the battery cable
- Poor connection or short-circuit of the discharging system
- Poor connection or short-circuit of the power generation system

Charging system does not operate properly

- Burnt fuse
- Poor contact, open or short circuit
- Regulator/Rectifier malfunctions
- AC Generator malfunctions

Engine does not crank smoothly

- Primary winding circuit
  - Poor ignition coil
  - Poor connection of cable and connectors
  - Poor main switch
- Secondary winding circuit
  - Poor ignition coil
  - Poor spark plug
  - Poor ignition coil cable
  - Current leakage in the spark plug
- Incorrect ignition timing
  - AC Generator malfunctions
  - Improper installation of CPS
  - ECU malfunctions

Weak starter motor

- Poor charging system
- The battery is not fully charged
- Poor connection in the windings
- The motor gear is jammed by foreign material

Starter motor is working, but engine does not crank

- Poor starter motor pinion
- The starter motor runs in reverse direction
- Poor battery

Battery

Removal

Open the seat.

Loosen 3 screw and remove the battery cover.
Disconnect the negative cable terminal first, then the positive cable terminal.

Remove the battery.

Voltage Check

Use the digital voltmeter to check the voltage of the battery.

Voltage:
Fully charged: **12.8V ↑ at 20℃**
Undercharged: **Below 12.0 V at 20℃**

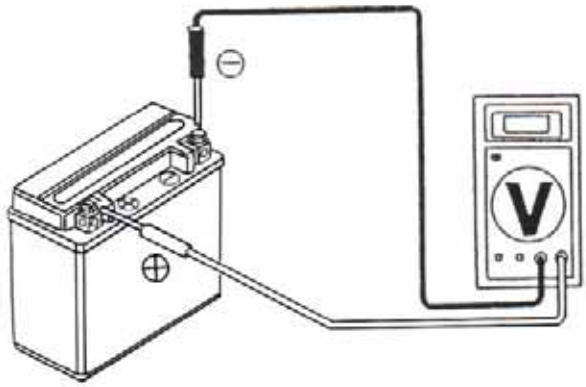
⚠ Warning

- Keep flames away while recharging.
- Charging is completely controlled by the ON/OFF switch on the charger, not by battery cables.

Charging

Connect the positive terminal (+) of the charger to the battery positive terminal (+).
Connect the negative terminal (-) of the charger to the battery negative terminal (-).

	Standard	Maximum
Charging current	1.2A	5A
Charging time	10 hr	1 hr

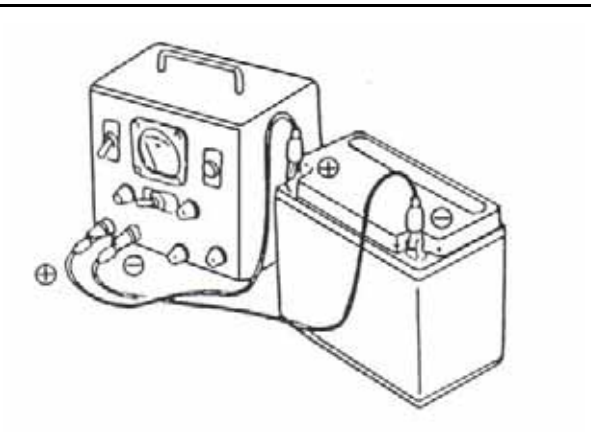


⚠ Warning

- Keep flames away while recharging.
- Charging is completely controlled by the ON/OFF switch on the charger, not by battery cables.

⚠ Caution

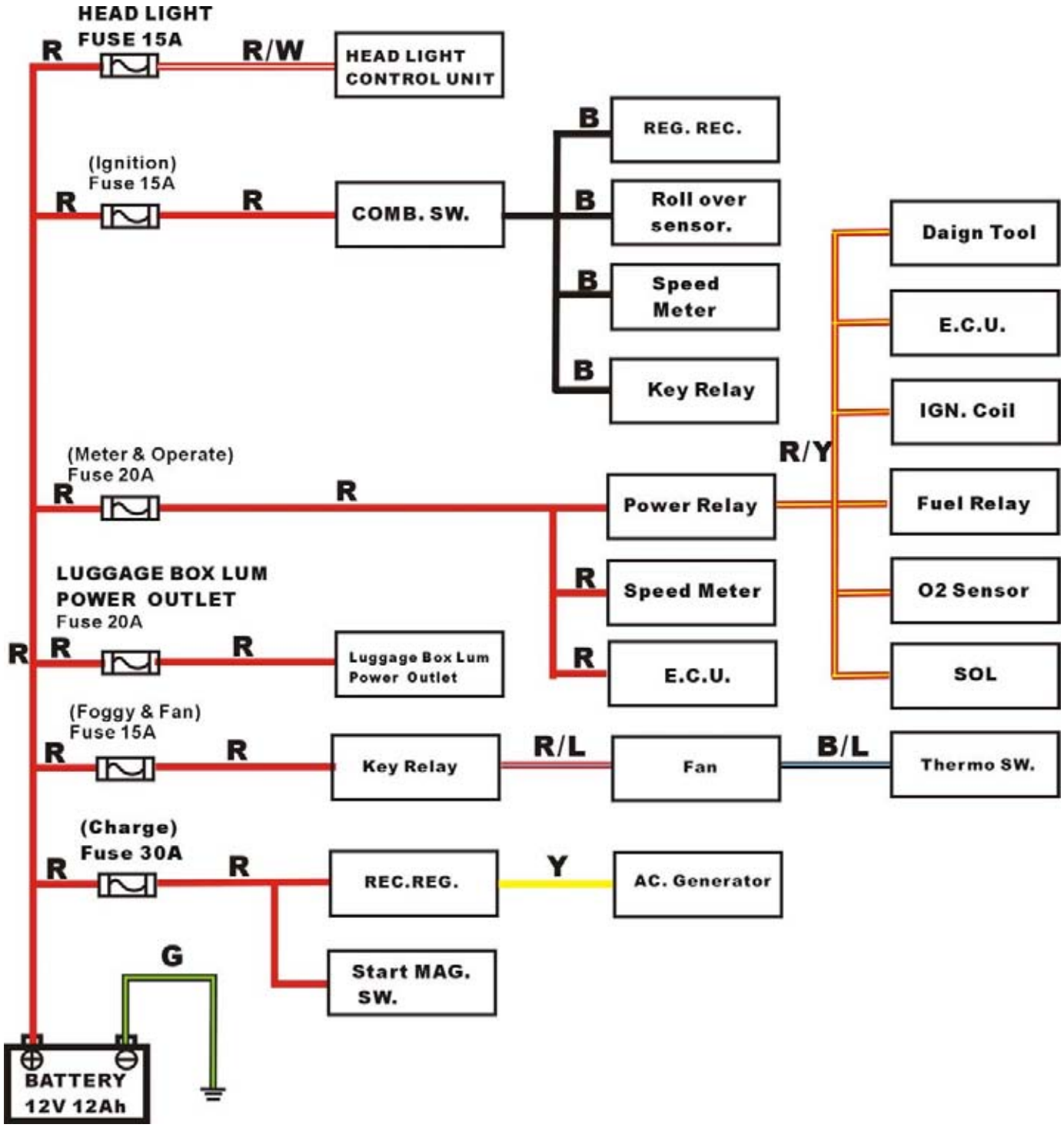
- Never rapid charge the battery unless in emergency.
- Verify the battery is recharged with current and duration prescribed above.
- Large current and fast time to charge will render damage to the battery.



When installing the battery, coat the cable terminal with grease.

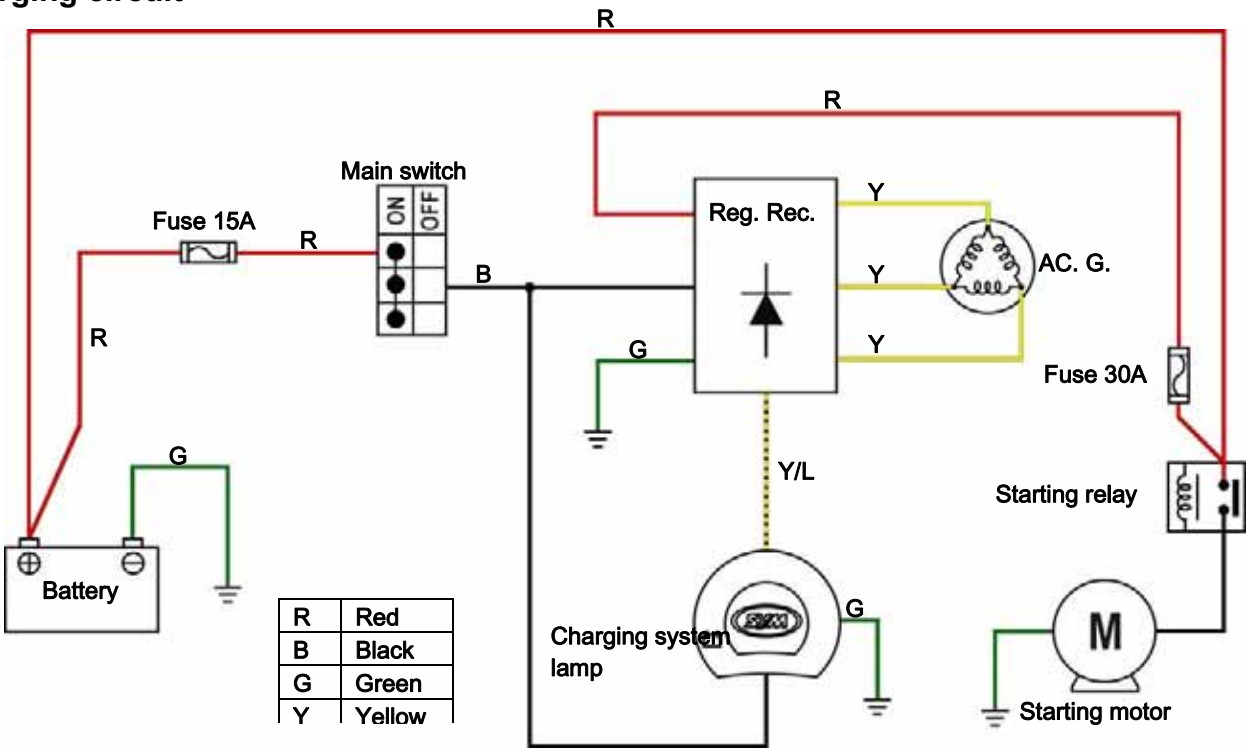
FUSE

Fuse circuit diagram



Charging System

Charging circuit



Regulator rectifier Inspection (KΩ)

+ / -	Y1	Y2	Y3	R	B	Y/L	G
Y1		∞	∞	∞	∞	∞	∞
Y2	∞		∞	∞	∞	∞	∞
Y3	∞	∞		∞	∞	∞	∞
R	∞	∞	∞		∞	∞	∞
B	5~30	5~30	5~30	∞		5~30	1~10
Y/L	∞	∞	∞	∞	∞		∞
G	2~20	2~20	2~20	∞	1~10	5~30	

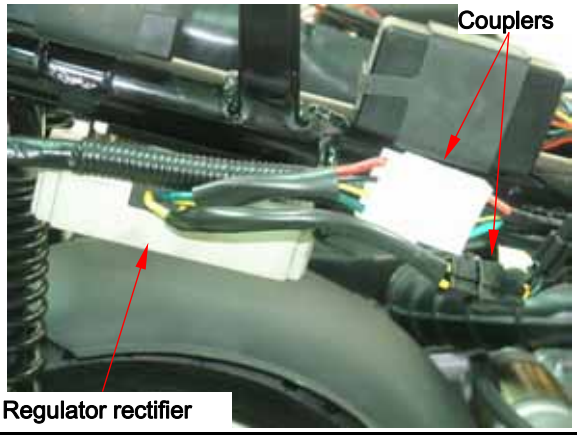
Inspection on regulator rectifier wire

Remove the luggage box, rear carrier and body covers.
Disconnect two 3 pin couplers of the regulator rectifier.
Inspection the rectifier coupler to the wire harness passes the condition.

Item	Check Points	Standard Value
Main switch connection	R—B	Battery voltage (ON)
Battery connection	R—G	Battery voltage
Charging coil	Y—Y	0.2~0.4 Ω

If the readings measured are not normal, check parts in the circuit.

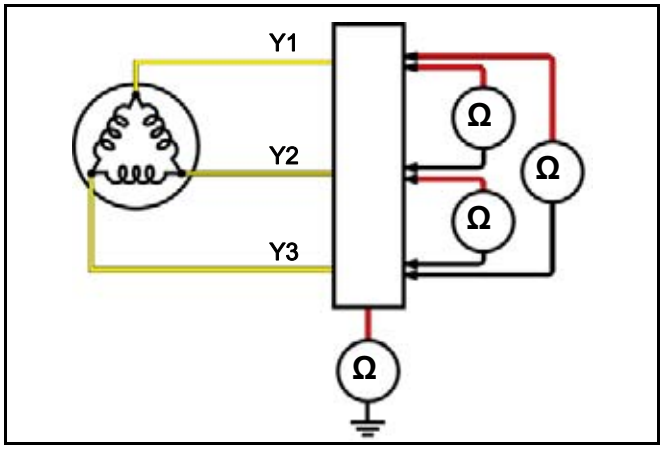
If the parts are normal, then trouble is in the wiring. If there is nothing wrong with parts and wiring, replace the regulator rectifier.



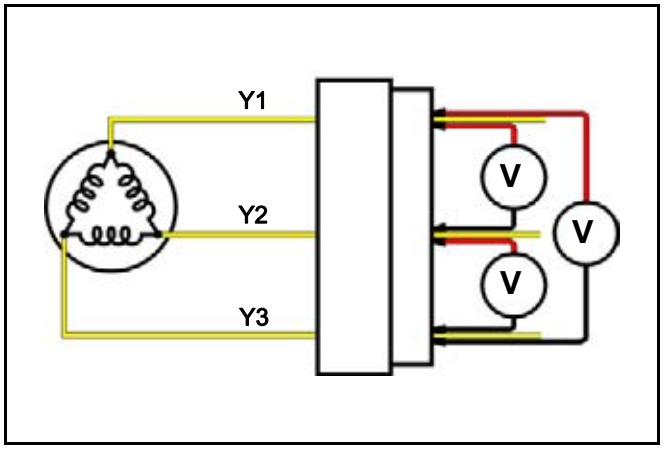
Inspection on AC. Generator coil

Remove the luggage box, rear carrier and body covers.
Disconnect 3 pin couplers of the generator coil.
Connect an ohmmeter to the each terminal end.
Check the continuity of the each terminal end, and engine ground with short circuit?
If there is no continuity or short circuit, replace the AC. Generator.

	V	Ω
Y1	70~80	0.2~0.4
Y2	70~80	0.2~0.4
Y3	70~80	0.2~0.4

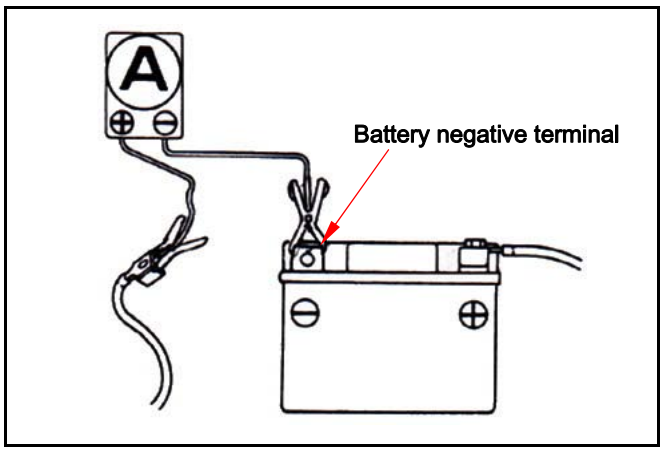


And you can check voltage by engine is running.



Current Leakage Inspection

Turn the main switch to OFF position, and remove the negative cable terminal (-) from the battery.
Connect an ammeter between the negative cable terminal and the battery negative terminal.
Disconnect each cable one by one and take measurement of the current of each cable to locate the short circuit.
Allowable current leakage: Less than 1mA

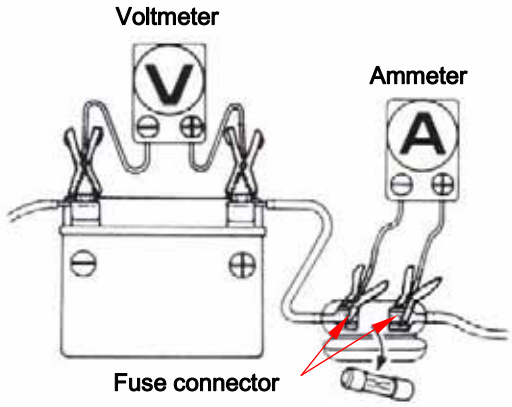


⚠ Caution

- In the current leakage test, set the current range at the largest scale, then gradually decrease to the lower scale as the test process goes to avoid possible damage to the ammeter and the fuse.
- Do not turn the main switch to ON position during test.

If the leaked current exceeds the specified value, it may indicate a short circuit.

Inspection on Charging Voltage



⚠ Caution

- Before conducting the inspection, be sure that the battery is fully charged. If undercharged, the current changes dramatically.
- Use a fully charged battery having a voltage larger than 13.0 V
- While starting the engine, the starter motor draws large amount of current from the battery.

After the engine is warmed up, replace original battery with a fully charged battery.
Connect a digital voltmeter to the battery terminals.
Connect an ammeter between both ends of the main fuse.

⚠ Caution

- When the probe is reversibly connected, use a voltmeter having an indication that the current flows from the positive or the negative direction and the measurement should be at zero, ammeter at one direction only.

⚠ Caution

- Do not use short-circuit cable.
- It is possible to measure the current by connecting an ammeter between the battery positive terminal and the cable position terminal, however, while the starter motor is activated, the surge current the motor draws from the battery may damage the ammeter. Use the kick starter to start the engine.
- The main switch shall be turned to OFF position during the process of inspection. Never tamper with the ammeter and the cable while there is current flowing through. It may damage the ammeter.

Connect a tachometer.
Turn on the headlight to high beam and start the engine.
Accelerate the engine to the specified revolution per minute and measure the charging voltage.
Specified Charging Current:
1.2 A / 6000 rpm
Control Charging Voltage:
14.5 V/1650 rpm

⚠ Caution

- To replace the old battery, use a new battery with the same current and voltage.

The following problems are related to the charging system, follow the instructions provided in the checking list to correct it if any one of the problems takes place.

1. The charging voltage can not exceed the voltage between two battery terminals and the charging current is in the discharging direction.
2. The charging voltage and current are too much higher than the standard values.

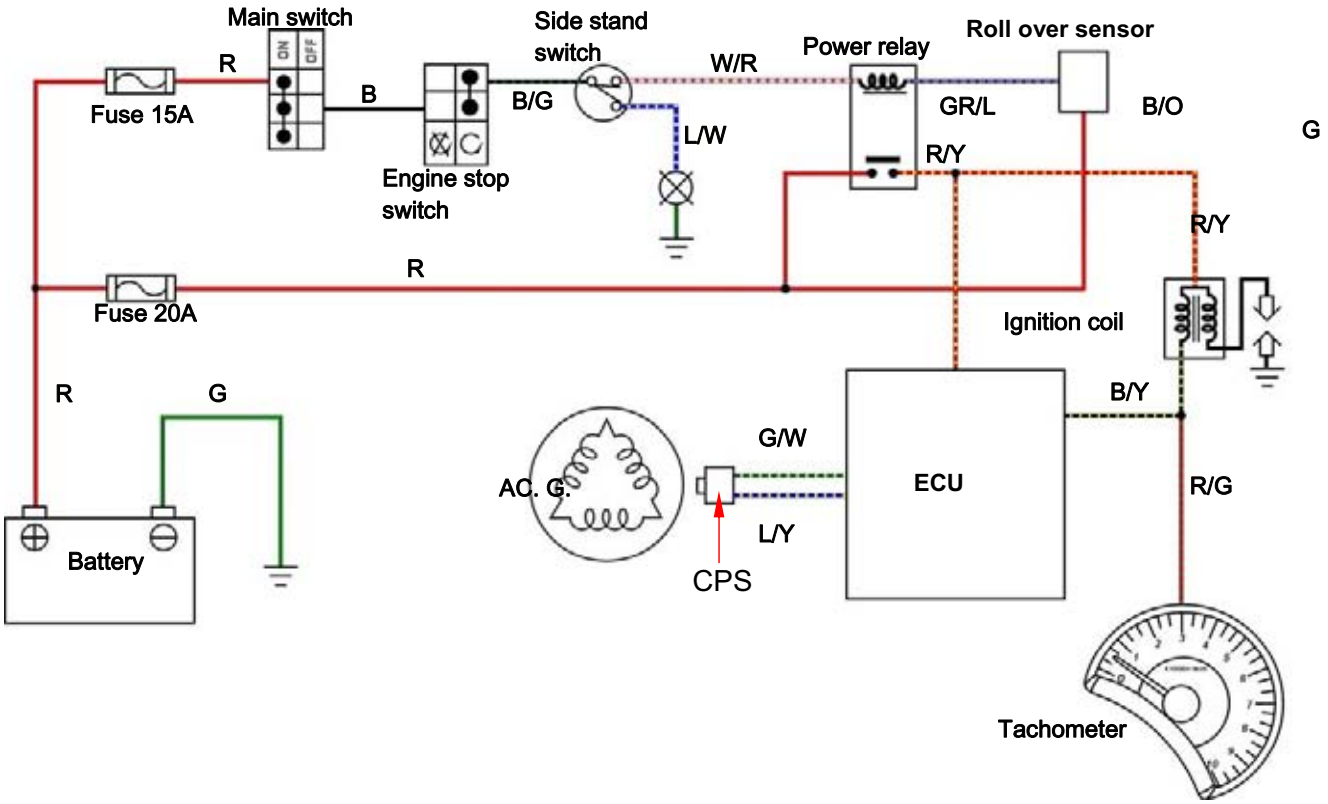
The following problems are not related to the charging system; correct it if any by following steps indicate in the checking list.

(1) The standard charging voltage and current can only reach when the revolution of the engine exceeds the specified rpm.
- Bulbs used exceed their rate and consume too much power.
- The replacement battery is aged and does not have enough capacity.

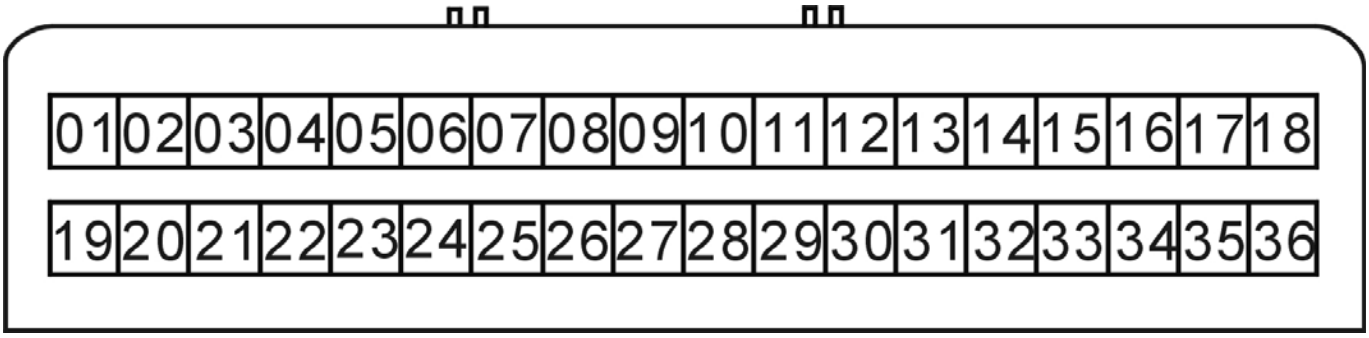
(2) The charging voltage is normal, but the current is not.
- The replacement battery is aged and does not have enough capacity.
- Battery used do not have enough electricity or is over charged.
- The fuse of the ammeter is blown.
- The ammeter is improperly connected.

(3) The charging current is normal, but the voltage is not.
-The fuse of the voltmeter is blown.

Ignition System



ECU. coupler (ECU. side)



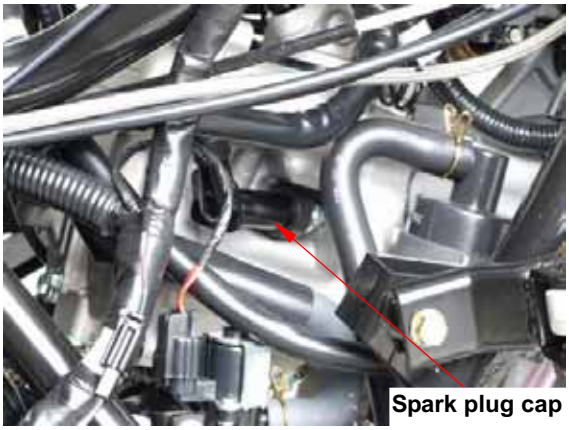
01 pin(R/Y)：Drive components Power.
03 pin(G/W)：Crankshaft position sensor negative.
09 pin(L/Y)： Crankshaft position sensor positive.
18 pin(G/W)：Ignition coil driver.

Inspection on ignition coil

Remove the right floor garnish.
Disengage the connector of the ignition coil.
Measure the resistance between the terminals of the primary winding.
Standard resistance: 2.8±15% Ω (20ºC)

Replacement on ignition coil

Remove the cap from the spark plug.



Loosen 2 bolts and replace the ignition coil if necessary.

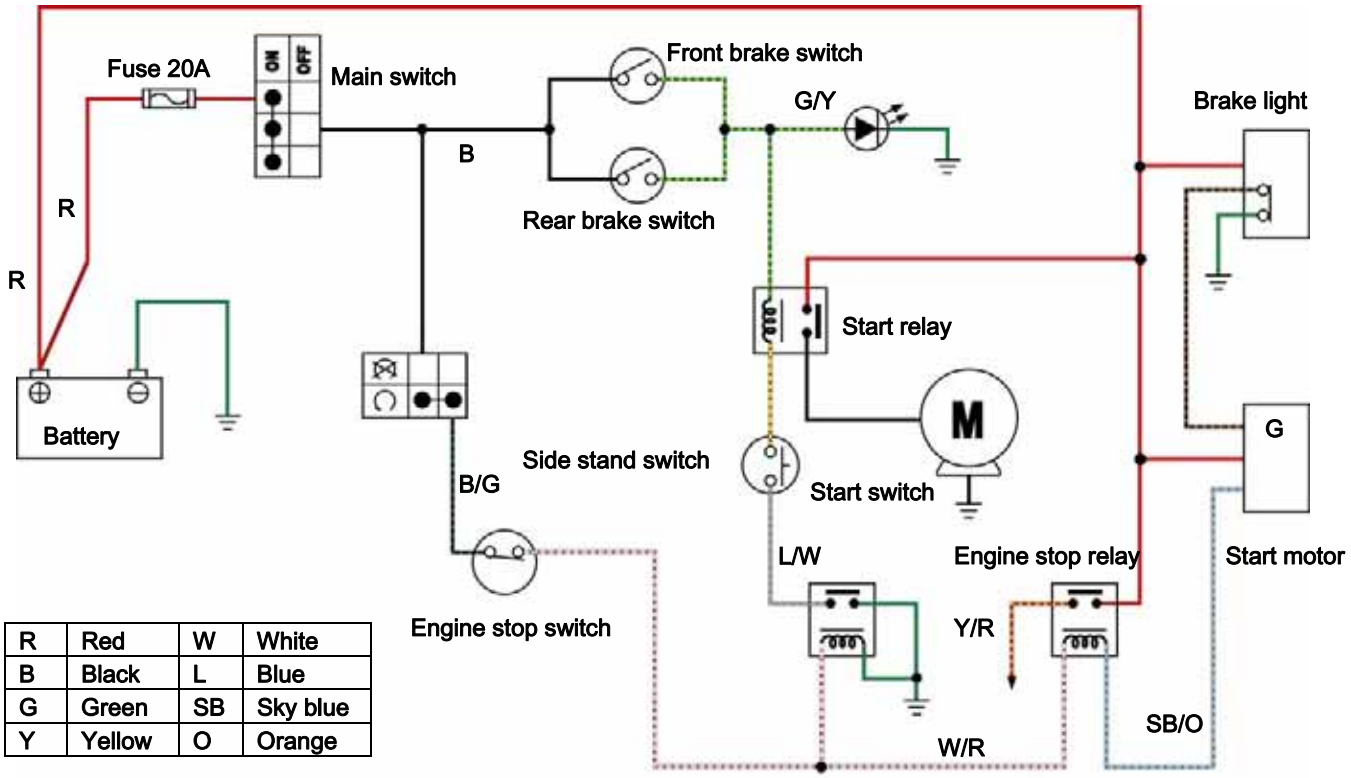
Inspection of crank position sensor

Remove luggage box (bolt×6).
Disconnect the coupler of the crank position sensor and measure the resistance between the terminals of green/white and blue/yellow.
Standard resistance: 80~160Ω

Please refer to the section 11 for disassembly of coil.

Starting System

Starting circuit diagram



R	Red	W	White
B	Black	L	Blue
G	Green	SB	Sky blue
Y	Yellow	O	Orange

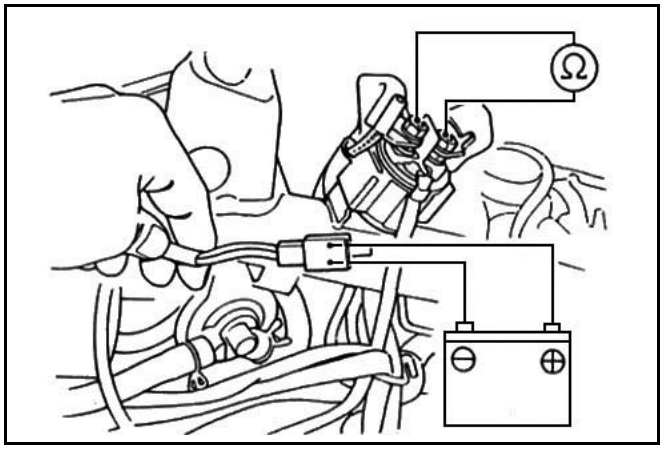
Inspection on starter relay

Open the main switch.
Press the brake.
Push down the starter switch.
If a sound of “Looh Looh” is heard, it indicates the relay function normally.

Open the seat, and remove battery cover.
Disconnect the negative cable terminal of the battery.

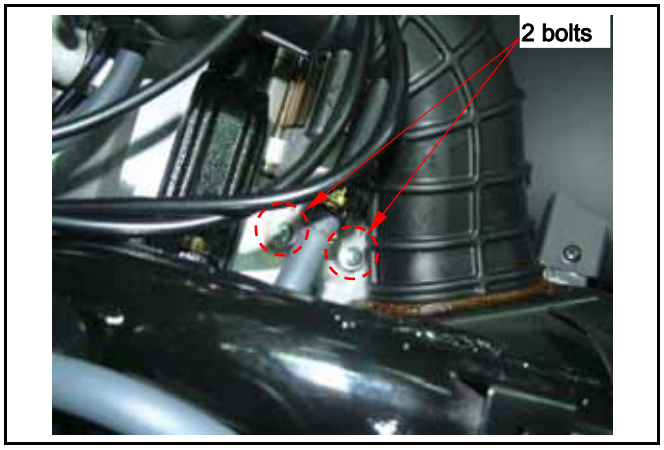
Remove the luggage box.
Disconnect the cable positive terminal from the start relay.

Disconnect the positive cable of the starter motor.
Disconnect the coupler of the relay.
Connect an ohmmeter to the large terminal end.
Connect the yellow/red cable to the battery positive terminal and the green/yellow cable to the battery negative terminal.
Check the continuity of the large terminal end.
If there is no continuity, replace the relay.



Removal of Starter motor

Turns off the main switch
Remove the luggage box.
Disconnect the coupler of the start relay.
Disconnect the cable negative terminal of the battery.
Disconnect the starter motor power cable.
Loosen 2 bolts & remove starter motor.

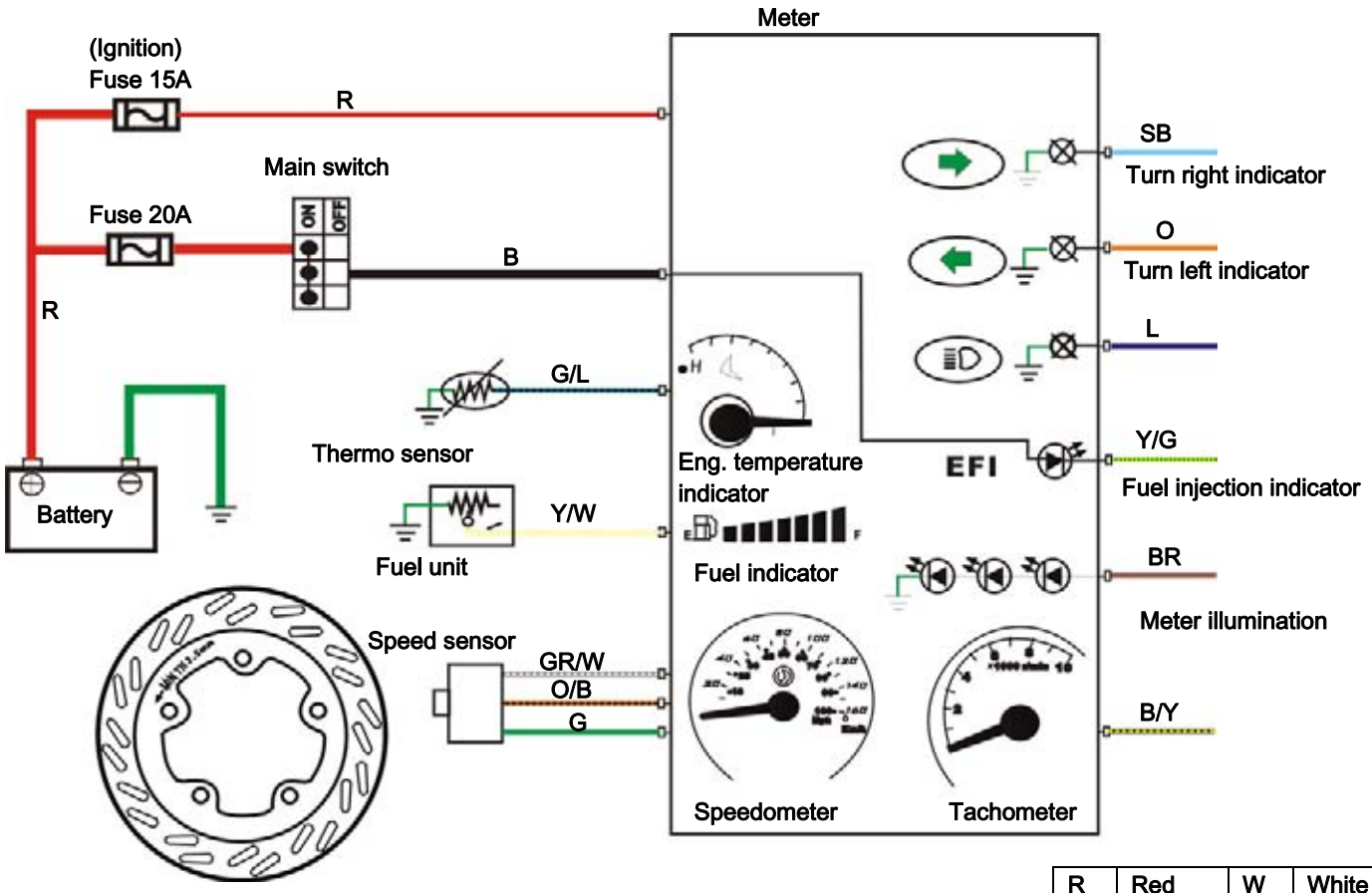


Installation of starter motor

Install in reverse order of removal procedures.

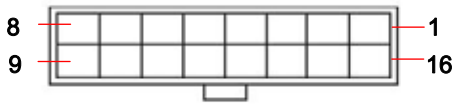
Meters

Meter circuit diagram

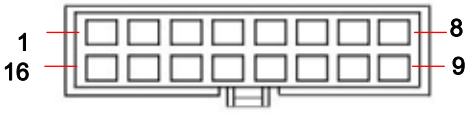


R	Red	W	White
B	Black	L	Blue
G	Green	SB	Sky blue
Y	Yellow	O	Orange
BR	Brown	GR	Gray

Meter coupler



Wire harness coupler



Wire harness coupler

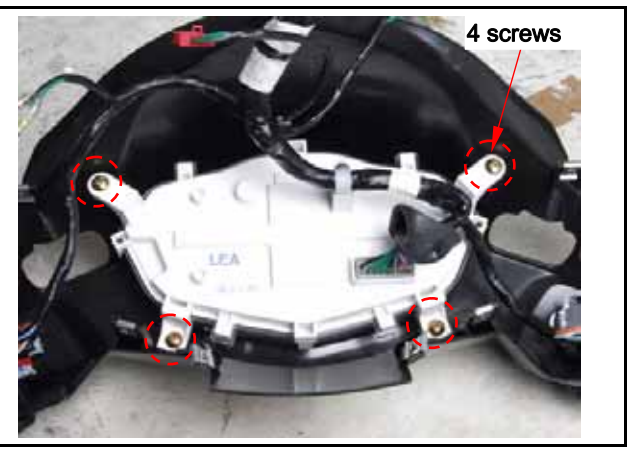
Red	Green / Blue	Yellow / White	Black	Green	Green	Green	Gray / White	Green / White
BATT+	TEMP.	Fuel+	IGN+	BATT-	SP-	Fuel-	SP+	SP-
Blue	Blue / White	Orange	Sky Blue	Brown		Yellow / Green	Orange / black	Black / Yellow
Hi-beam	Side stand	Turn-L	Turn-R	ILLUMI.		EFI	SP	RPM

Removal of meter

Remove front cover, handle front cover, handle upper cover.
(Refer chapter 14)

Disconnect the coupler of the speedometer, and take off the meter.

Loosen 4 screws from meter panel.
Remove the speedometer.



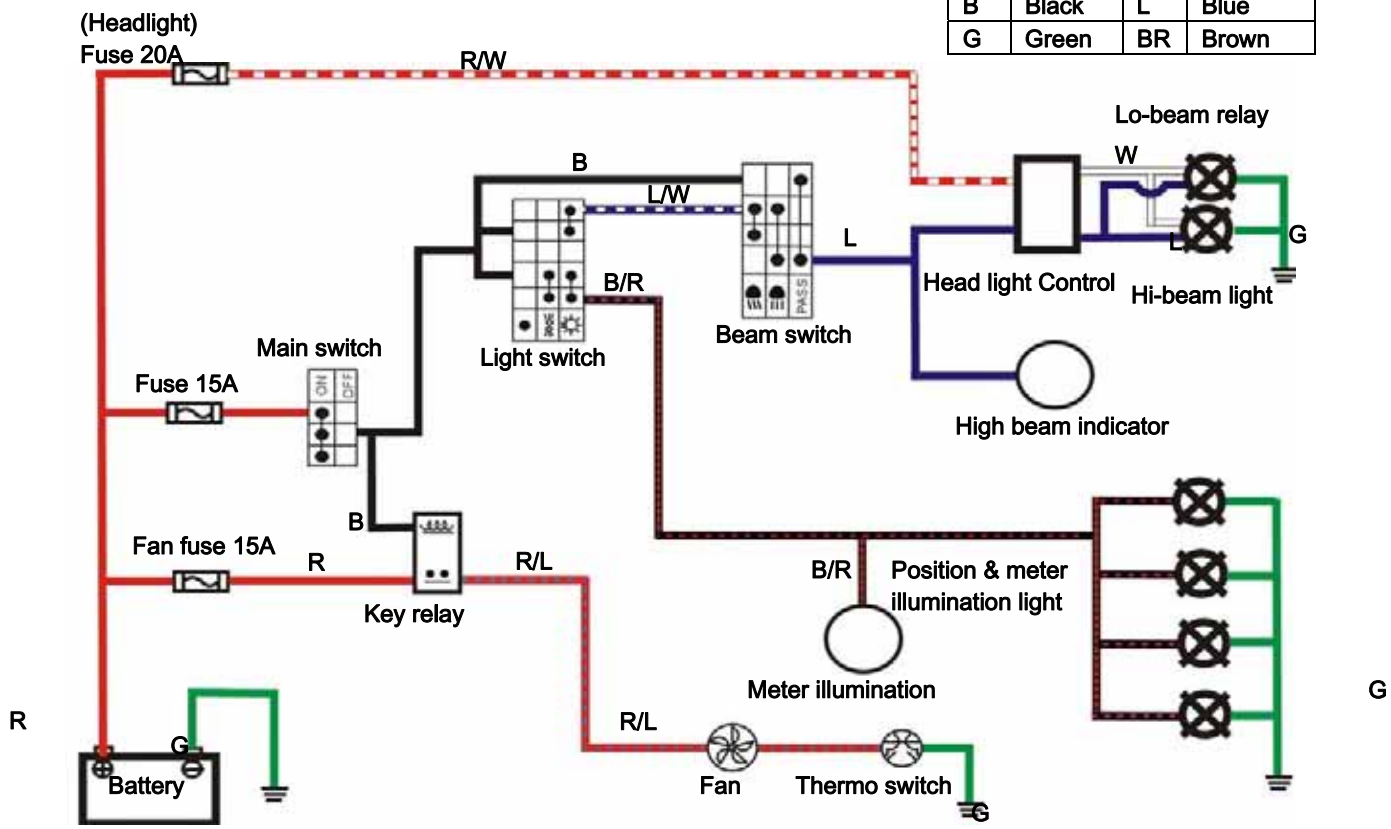
Installation of meter

Install in reverse order of removal procedures

Light / Bulb

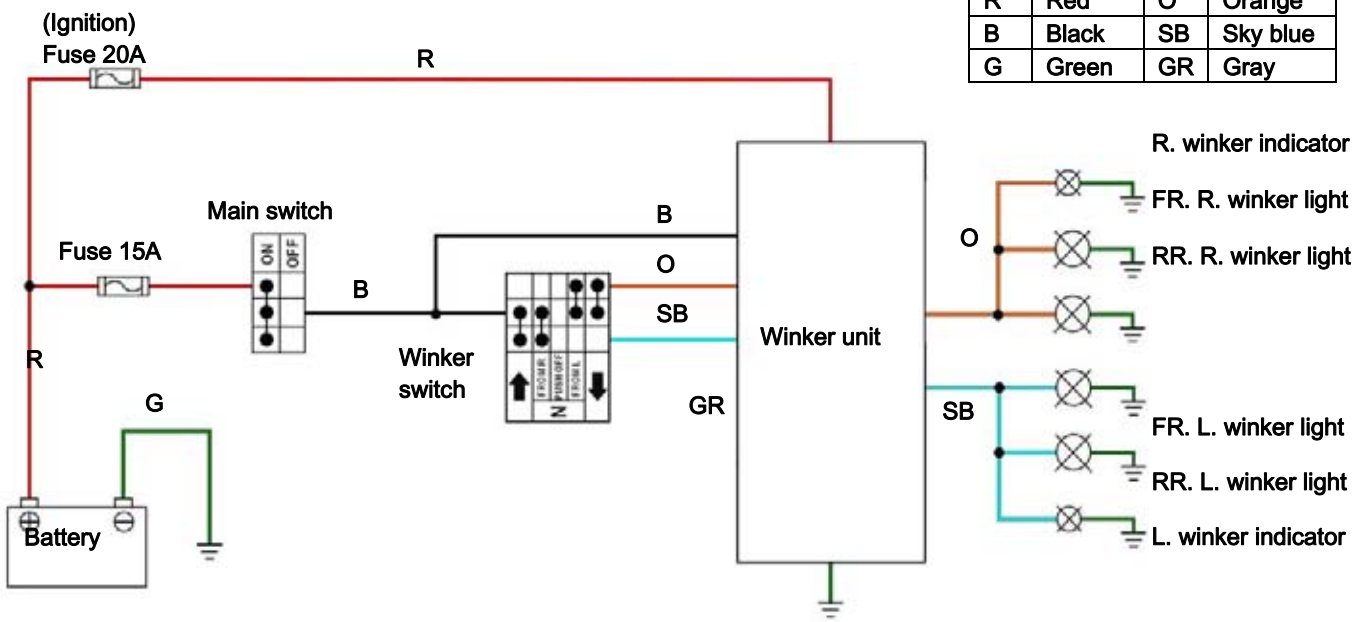
Headlight and foggy light circuit diagram

R	Red	W	White
B	Black	L	Blue
G	Green	BR	Brown



Winker light circuit diagram

R	Red	O	Orange
B	Black	SB	Sky blue
G	Green	GR	Gray



Headlight bulbs replacement

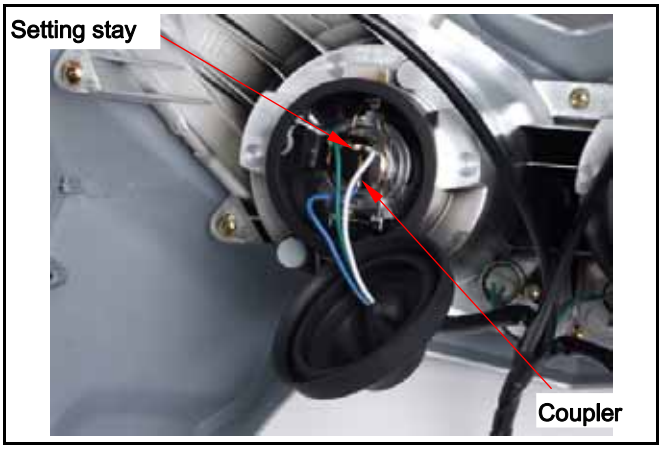
Remove front cover.
(Refer chapter 13)
Disconnect the rubber sleeve and the terminal coupler from the headlight.
Remove setting stay and take out the headlight bulb.
Replace with new bulb if necessary.

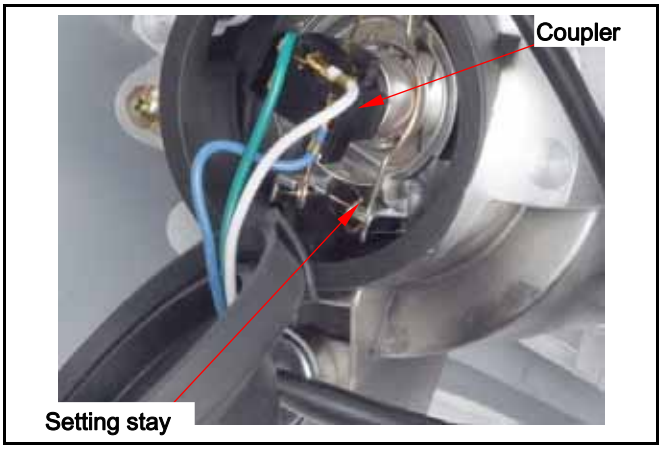
Specification:

Lo-beam bulb	**12V 35W**
Hi-beam bulb	**12V 35W**

⚠ Caution

- Never touch the bulb with finger, which will create a heat point.
- Clean the fingerprint left on the bulb with alcohol.

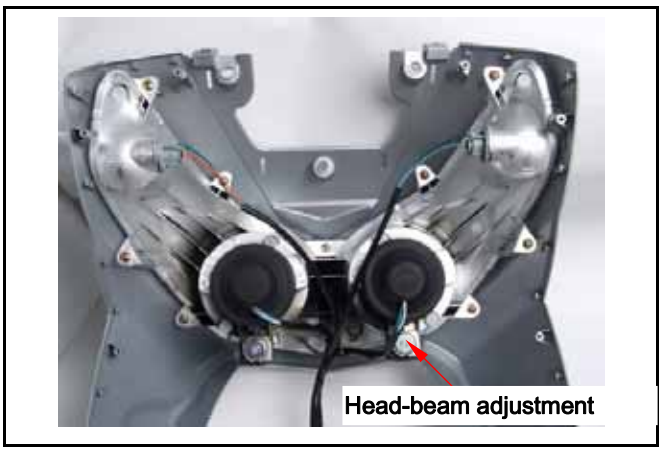




Installation

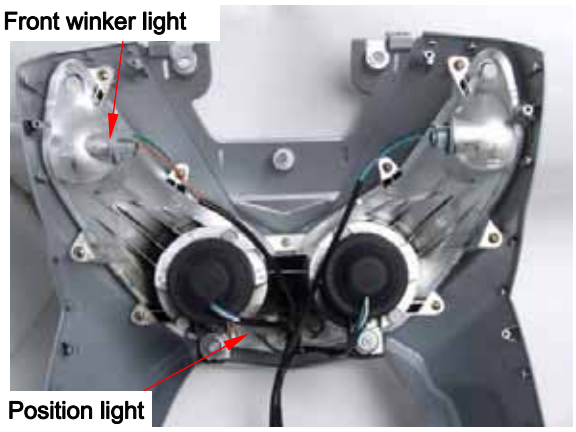
Install the bulb of the headlight in reverse order of removal.

Upon completion of replacement, turn on the main switch to ensure the headlight works well.
Adjust the beam and distance of the headlight if necessary.

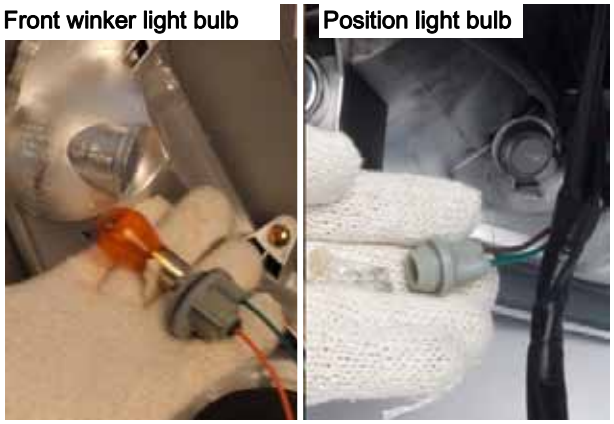


Front winker light and Position light bulb Replacement

Remove front cover.
(Refer chapter 13)



Disconnect the rubber sleeve and turn the foggy light bulb seat in C.C.W. direction to remove the bulb seat and bulb.
Turn the winker light bulb seat in C.C.W. direction to remove the bulb seat and bulb.
Replace with new bulb if necessary.
Specification:
Position light bulb 12V 5W
Winker light bulb 12V 21W



Rear winker light bulb replacement

Remove the luggage box.
Turn the winker light bulb seat in C.C.W. direction to remove the bulb seat and bulb.

Presses the bulb, counterclockwise rotation and remove it.
Replace with new bulb if necessary.
Specification:
Winker light bulb 12V 21W

Switch / Horn

Main switch

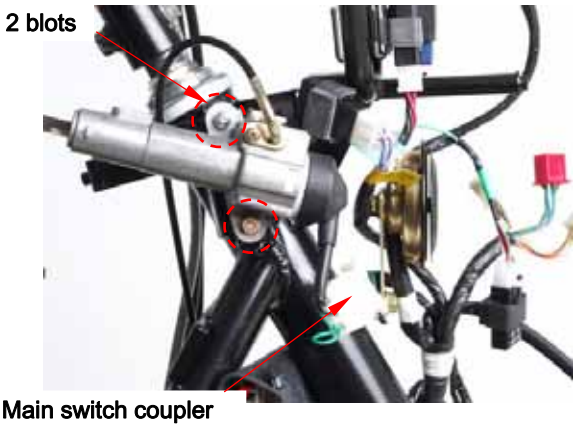
Inspection

Remove the front cover.
Disconnect the main switch coupler.
Check the continuity between two points as indicted below

Pin / Position	BAT	BAT1	BAT2
LOCK			
OFF			
ON	●	●	●
Wire Color	Red	Black	Blake

Replacement of main switch

Remove main switch cap. (1 bolt).
Disconnect the coupler of the main switch and loosen the mounting bolts (2 bolts).
Remove the main switch.
Install the new main switch and tighten the mounting bolts.
Install the main switch coupler and cap.

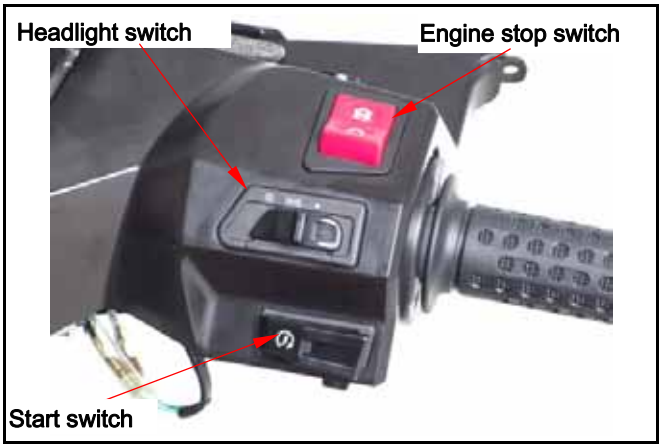


Right handle switch

Remove the handle cover and front cover.
Disconnect the coupler of right handle switch.
Check the continuity between two points as indicated in the table below

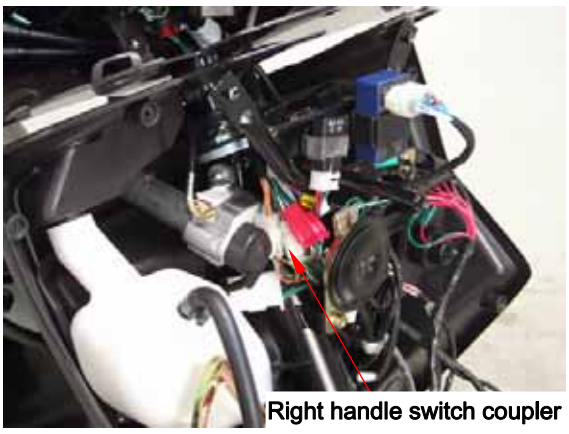
Headlight switch

Pin / Position	TL	CI	HL	CI
●				
DC	●	●		
☼	●	●	●	●
Wire Color	Brown	Black	Black	Blue /White



Start and engine stop switch

Pin / Position	ST	E	ST	E
⊗				
∩	●	●		
FREE				
ϟ			●	●
Wire Color	Black	Black /Green	Yellow / Red	Sky blue/ Orange



Left handle switch

Remove the handle cover and front cover.
Disconnect the coupler of left handle switch.
Check the continuity between two points as indicated in the table below

High and low beam switch

Position \ Pin	LO	HL	HI	PASS
≡D		●	●	
D	●	●		
PASS	●			●
Wire color	White	Blue / White	Blue	Brake

Winker switch

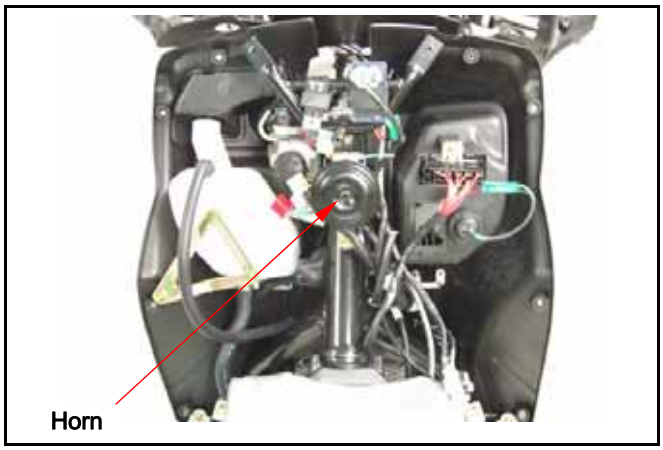
Position \ Pin		R	WR	L
⇨		●	●	
N	FROM R	●	●	
	PUSH OFF			
	FROM L		●	●
⇦			●	●
Wire color		Sky blue	Gray	Orange

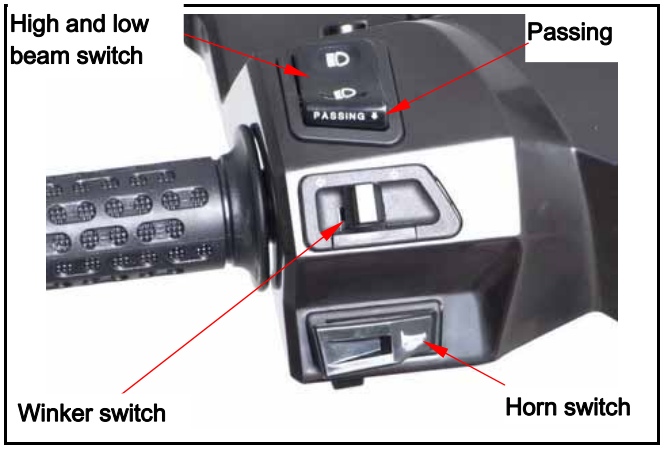
Brake Switch

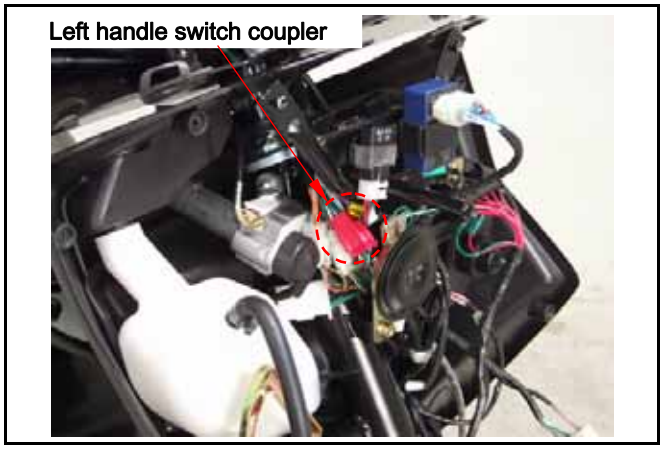
While grasp the brake lever firmly, the terminals of white/green and green/yellow of the brake should have continuity.
Replace the switch if damaged.

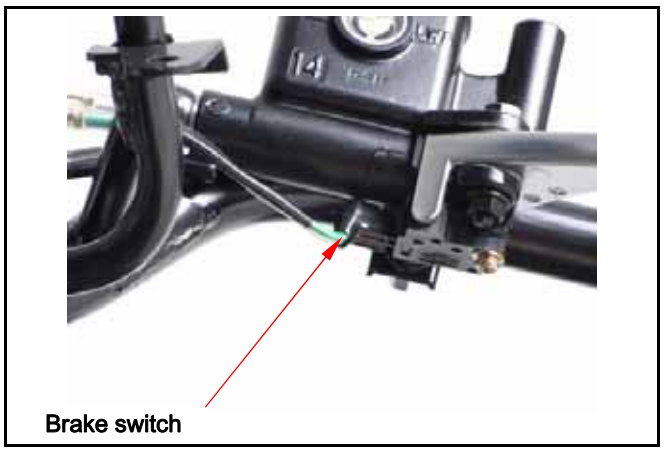
Horn

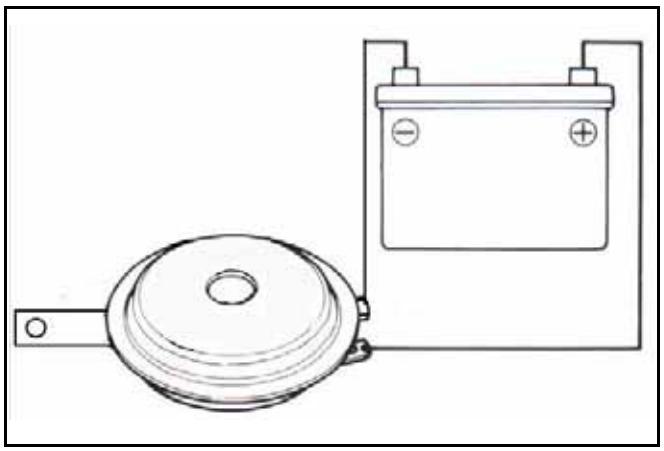
Remove the front cover and front under spoiler.
Apply 12 V power source to two terminals of the horn, the horn should sound.
Replace the horn if necessary.





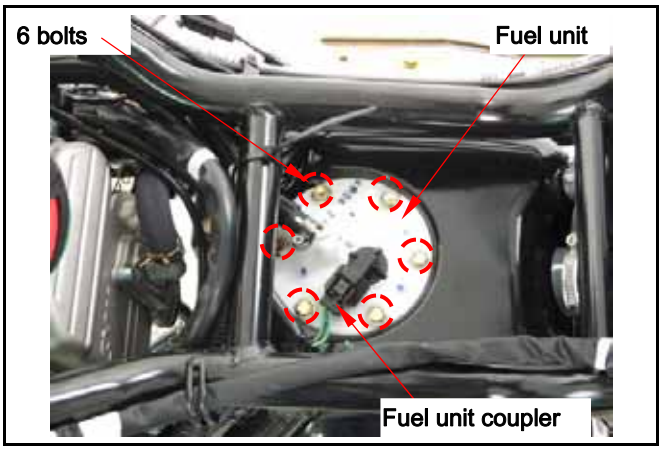






Fuel Unit

Open the seat.
Remove the luggage box.
Remove the rear carrier.
Remove right & left side cover.
Remove the body cover
Remove the floor panel.
Disconnect the coupler of the fuel unit.
Loosen 6 bolts from fuel unit and remove it.

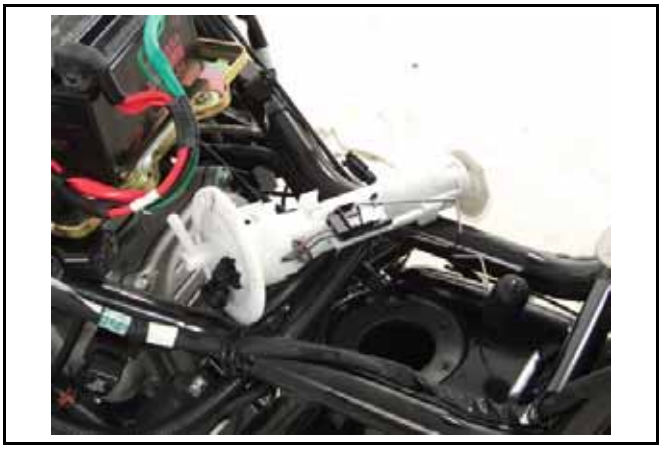


⚠ Caution

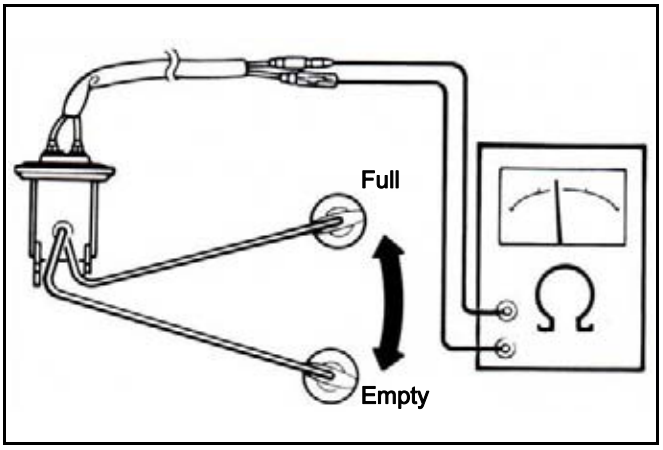
- Great care shall be taken not to damage or bend the float arm of the gauge.

When the float arm shifts to the F position or the E position, the resistance measured shall be as follows:

Position	Resistance
E (Empty)	97.5~107.5 Ω
F (Full)	4~10 Ω



Connect the wiring to the fuel unit and the ohmmeter as shown.
Connect the fuel unit coupler to the wire harness.
Turn on the main switch.
Move the float arm to verify the proper position the fuel gauge needle indicates.



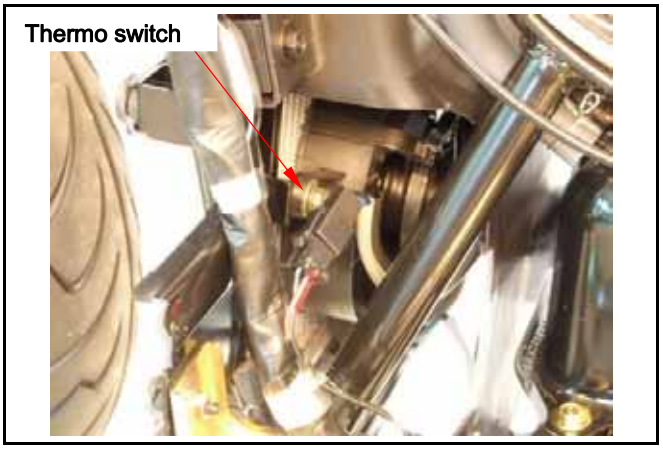
Arm Position	Needle Position
Up (Full)	F (Full)
Down (Empty)	E (Empty)

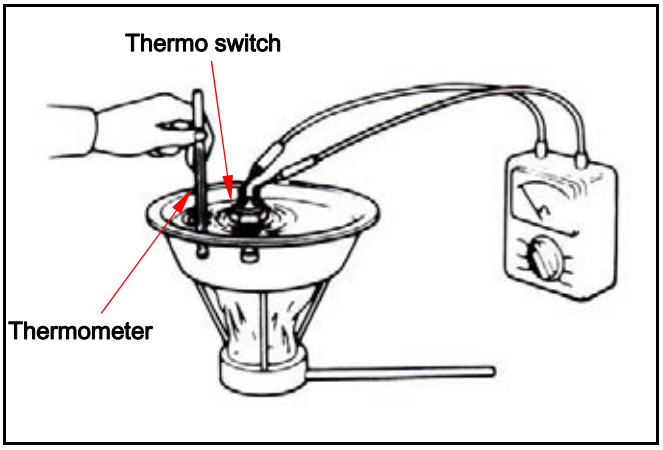
⚠ Caution

- While conducting the test, turn on the direction indication lamp to make sure that the battery is in serviceable condition.

Cooling Fan Thermo Switch

The thermo switch mounted on the radiator controls the operation of the cooling fan motor.
In case that the fan motor fails to work, disconnect the green and black/blue leads and connect jump wires to the terminals, then, turn on the main switch, the fan motor should operate.
If the fan motor still fails to run, measure battery voltage between the green and black / blue leads. If there is no voltage, check for blown fuse, loose connection or short-circuit.
If the fan motor runs, check the thermo switch in the manner as described below:
Hang the thermo switch on the bowl filled with coolant to check the switch's opening and closing temperatures, confirm the switch is open circuited at room temperature, increase the coolant temperature gradually. The switch should have a continuity at 95-101℃.





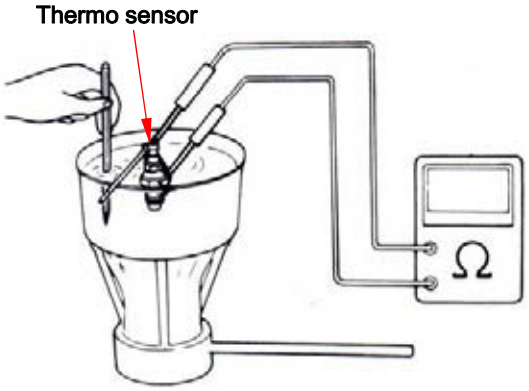
⚠ Caution

- Keep the coolant at a constant temperature at least for three minutes. Sudden increase the coolant temperature will cause the thermometer and the tester to indicate wrong readings.
- Never let the thermometer and the thermo switch contact the wall of the bowl, which may result in wrong readings.
- The thermo switch shall be placed in the coolant until the teeth are completely submerged.

Thermo Unit

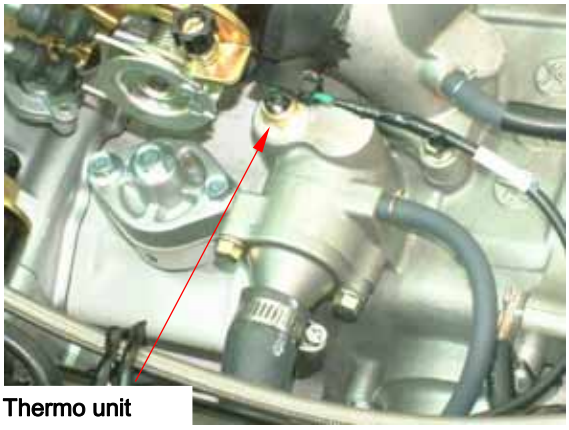
Remove the thermo unit.
Hang the thermo unit in an oil heater, heat the oil and measure the resistance at each temperature.

Temperature	50°C	80°C	100°C	120°C
Standard (Ω)	134~149	47.5~57.0	26~29	14.8~17.2



⚠ Caution

- Wear gloves and goggles when performing this test.



⚠ Caution

- Engine oil should be used as a heating medium as the test temperature must be higher than 100℃.
- Contacting the container wall by the thermometer and the thermo unit may result in wrong readings.

Water Temperature Meter

Disconnect the thermo unit coupler and connect it to engine ground.
Turn on the main switch.
The needle of the water temperature meter should move to other end, H position.

⚠ Caution

- Do not ground the water temperature more than 5 seconds, or the meter will be damaged.

Note:

Emission Control System Classification ····· 18-1
Emission Control System Description ····· 18-1
Evaporative Emission Control System (E.E.C.) ····· 18-2
Catalytic Converter (CATA) ····· 18-4
Positive Crankcase Ventilation System (P.C.V.) ····· 18-5
Inspection Items ····· 18-6
Countermeasure for Abnormal Emission Pollutants ····· 18-7

Emission Control System Classification

1. Evaporative Emission Control System (E.E.C.)
2. Catalytic Converter (CATCON.)
3. Positive Crankcase Ventilation System (P.C.V.)

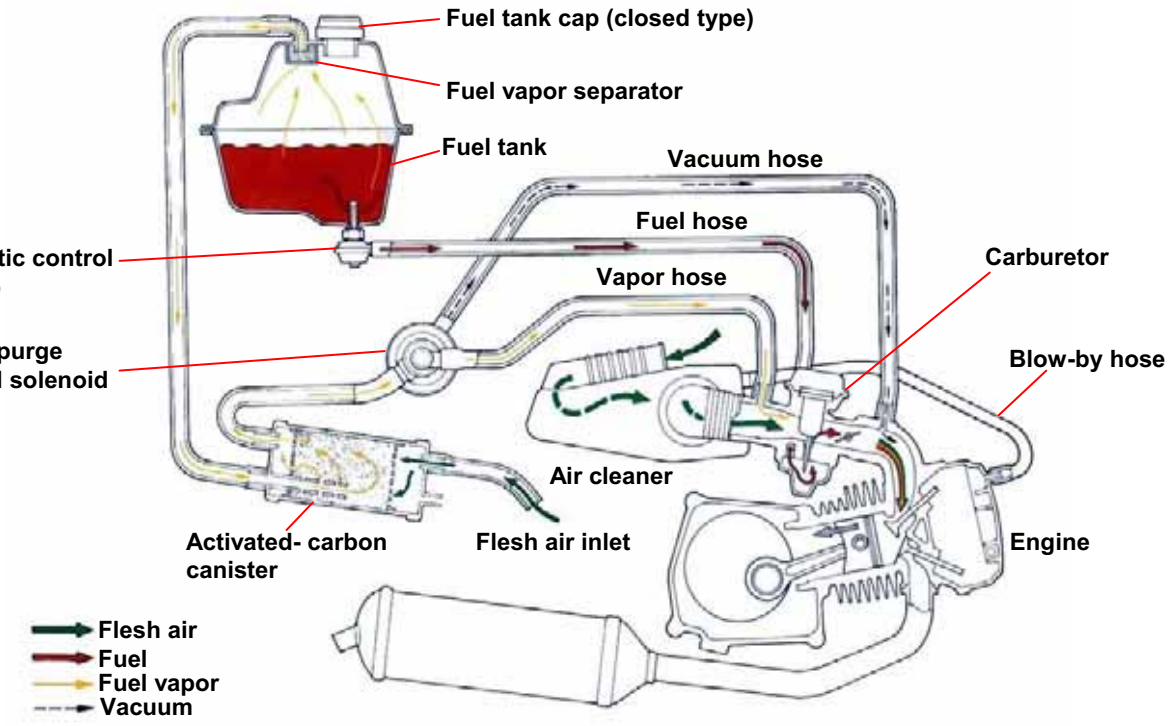
Emission Control System Description

System	Device	Components	Purpose & function
Combustion chamber	Combustion chamber	4-valve combustion chamber	The semi-circular combustion chamber is designed to balancing the air stream to achieve the combustion stability.
Exhaust system	Post-treatment device	Catalytic converter	Installed a three-way catalytic converter in the middle of exhaust pipe to oxidize the CO, HC in the exhaust gas.
E.E.C. system	Evaporative emission control system	Activated-carbon canister Purge control valve	A canister is used to absorb vapor from fuel tank and to introduce it into the intake manifold at an opportune timing.
P.C.V. system	Crankcase blow-by gas introducing device	Vapor separator	To introduce blow-by gas into combustion chamber via a vapor separator for burning.

Evaporative Emission Control System (E.E.C.)

1. Construction:

- Reduce HC to pollute air.
- To absorb fuel vapor and saving fuel consumption



2. Principle of operation

- Vapor generated in fuel tank and fuel system through evaporation is collected in the confined system to prevent it from escaping into the atmosphere, at the same time, the vapor will be introduced into a charcoal canister where the hydrocarbon in the vapor will be absorbed by activated carbon.
- When the engine is running, the negative pressure of intake manifold opens the purge control valve, forces HC off from activated carbon and then sucks it into engine together with air from bottom of the canister.
- The canister can be used repeatedly without reducing its performance because of the system's purge function.

3. Trouble Diagnosis:

- No fuel in the fuel tank
- Loosen vacuum hose of the fuel pump
- Jammed hose in the system

4. Cautions:

- Do not exceed the reed valve of the fuel filler when filling fuel.
- Do not have rush acceleration or running in high speed when applying the spare fuel.

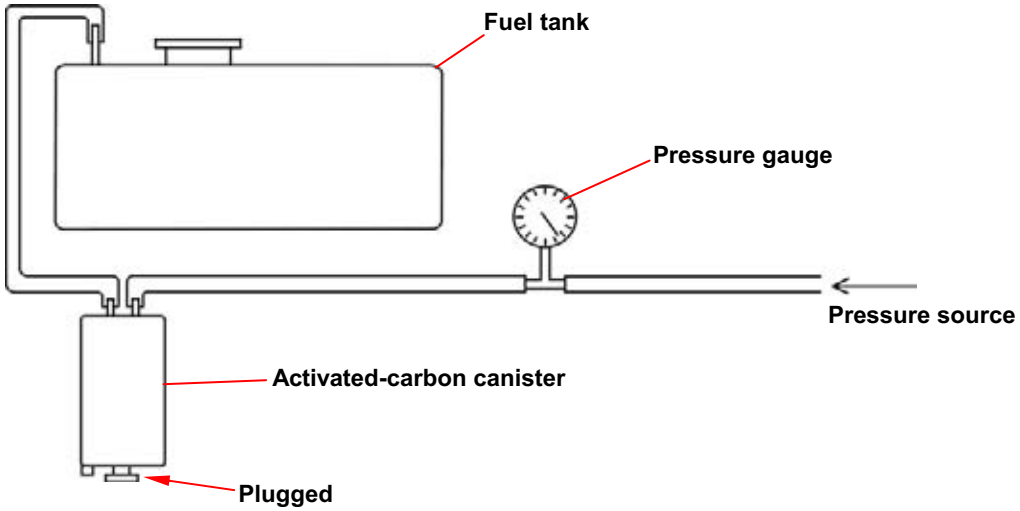
Evaporative Emission Control System (E.E.C.) Inspection

1. Visual check:

1) Check the outside of canister for damage.
2) Check all hoses for breakage.

2. Leakage test:

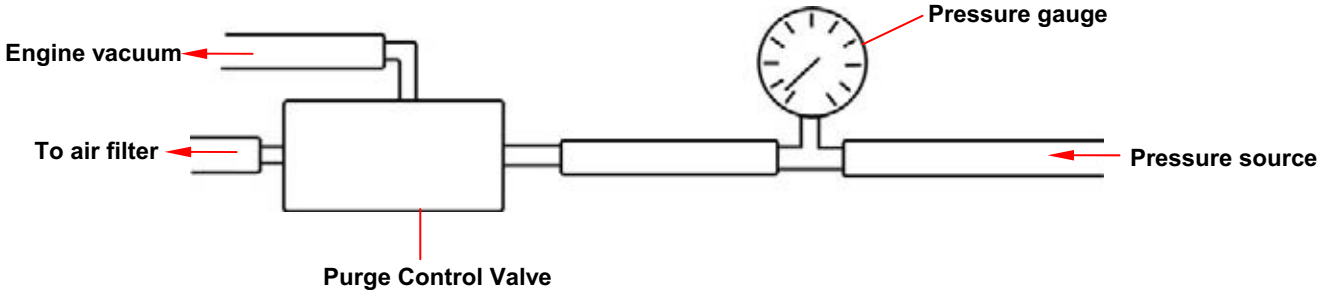
1) Disconnect the Purge Control Valve hose, and connect a T-type hose connector to a pressure gauge and a pressure source as shown below:



2) Plug canister vent.
3) Apply 100mmAq into pressure source inlet then plug it. The pressure at the gauge should not drop to below 10mmAq within 10 seconds.

3. PCV Function Test

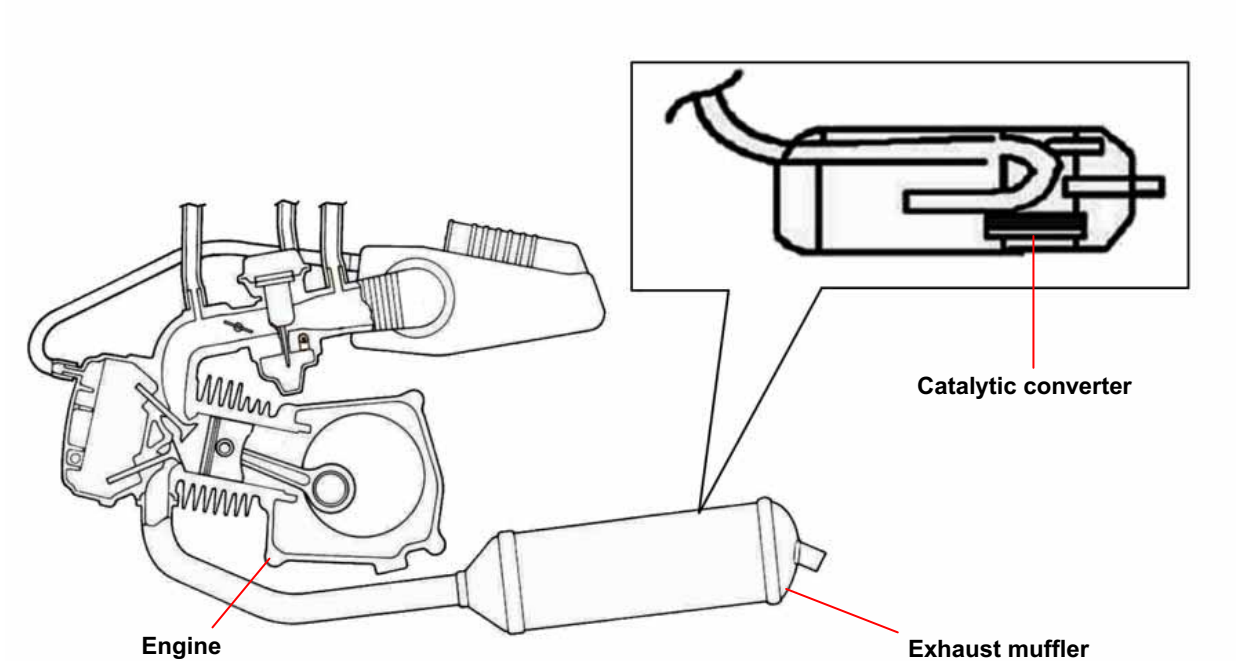
1) Disconnect the hose of connection to the activated-carbon canister, and then connect a T-type hose connector to pressure source as shown below:



2) Apply 100mmAq into pressure source inlet as engine stopped then plug it. The pressure at the gauge should not drop to below 10mmAq within 10 seconds.

Catalytic Converter (CATA)

1. Construction:

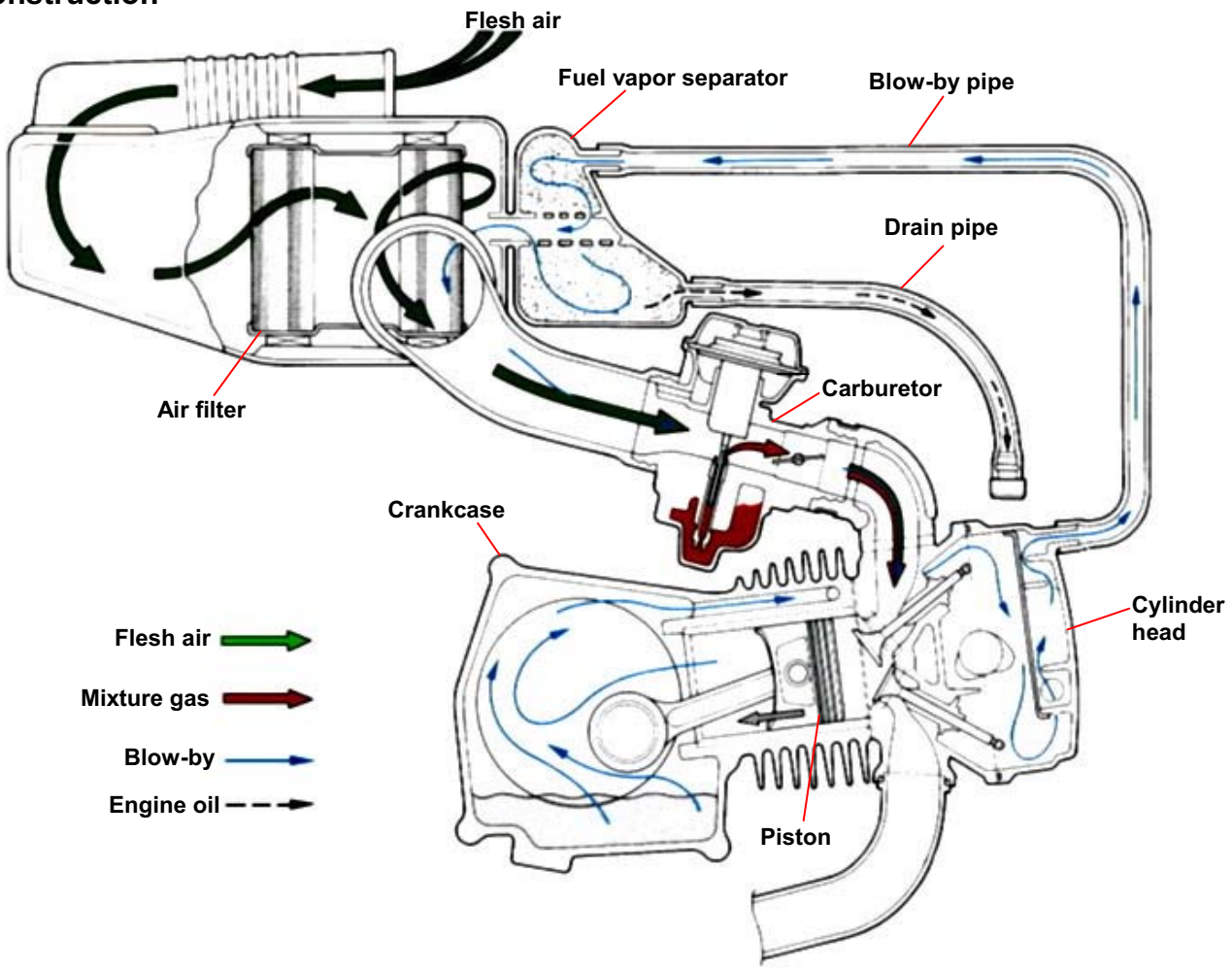


2. Description:

1) The function of the catalytic converter is to transfer unburned CO, HC, and NOx to harmless CO_2, H_2O, N_2 gases.
2) Pt, Pd, Rh…etc. precious metals are used into the catalytic converter so use only unleaded gasoline to prevent from cause the catalytic converter to fail.

Positive Crankcase Ventilation System (P.C.V.)

1. Construction



2. Principle of operation:

- Install a separated chamber on cylinder head, and suck the blow-by gas to the fuel vapor separator by engine vacuum.
- Drill a hole in the air cleaner and install a vapor separator, so that blow-by from crankcase will flow through a cylinder check valve and then separated by the separator.
- The separated vapor will be sucked into combustion chamber by engine negative pressure to be burned again instead of discharging into atmosphere. Drain liquidized fuel in the drain pipe periodically.

3. Service Methods

Visual check:

- Remove drain plug to drain the fuel when fuel level on the drain pipe reaches 80 % full.
- Check connecting hose for damage and looseness.

Inspection Items

Fuel Evaporation Control System

1. Visual inspect the carbon canister and hoses for damage.
2. Leaking check.
3. Function test of the purge control solenoid.

Catalytic converter

1. Check if exhaust gas content is within standard.
2. Remove the exhaust pipe and shake it gently for noise.

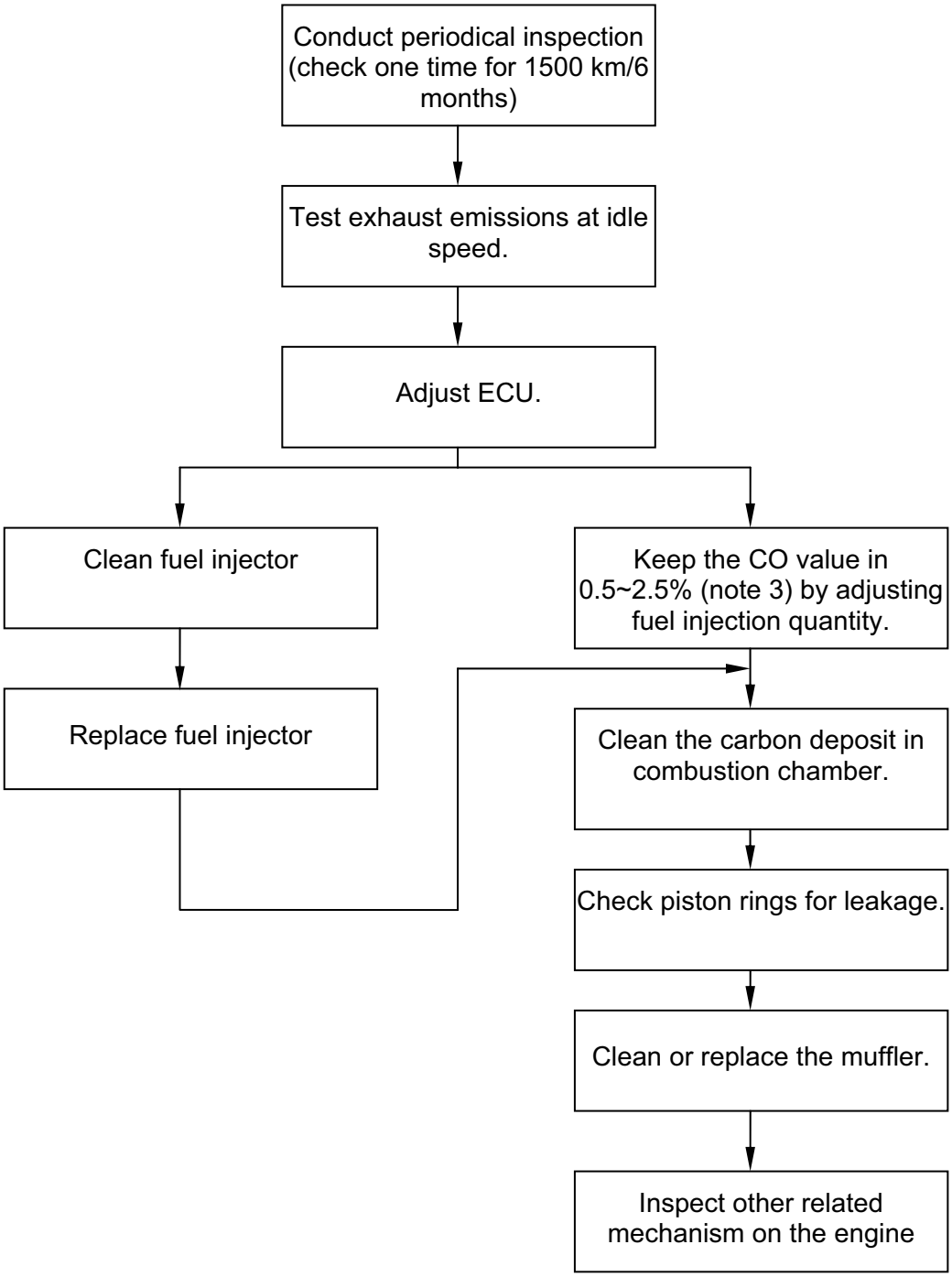
Fuel Supply System

1. Clean the air filter.
2. Check the air filter.
3. Clean the carburetor fuel jet, air jet and all circuit with air gun or specified solvent.
4. Check the float level of carburetor.
5. Adjust CO/HC values at idling. (engine rpm must be within specification)

Ignition system

1. Spark plug check and replacement.
2. Ignition coil check and replacement.

Countermeasure for Abnormal Emission Pollutants


Conduct periodical inspection (check one time for 1500 km/6 months)
Test exhaust emissions at idle speed.
Adjust ECU.
Clean fuel injector
Replace fuel injector
Keep the CO value in 0.5~2.5% (note 3) by adjusting fuel injection quantity.
Clean the carbon deposit in combustion chamber.
Check piston rings for leakage.
Clean or replace the muffler.
Inspect other related mechanism on the engine

Note: If CO value can not be adjusted to the default value by adjusting ECU, follow the procedures to check or replace components.

LH30W EFi Electrical Diagram